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An Index to the Sixty-second Volume of The Railway Gazette, *covering the issues from January 4 to June 28, 1935, is presented as a Supplement to each copy of this week's issue.*

Remarkable Locomotive Work on the L.M.S.R.

ON page 33 of this issue a description is given of two noteworthy feats of locomotive performance on the London Midland & Scottish Railway. The interest of the comparison lies in the fact that one was a test run on which high speed was premeditated; whereas the other was an enterprising attempt by the driver of the express immediately following the test train, to recover some at least of a late start. Both trains were made up to fifteen coaches, the train on the test run being hauled by the 4-6-2 locomotive *The Princess Royal,* and the second train—slightly the heavier of the two—by a "Royal Scot" 4-6-0. The former succeeded in cutting the fastest booking of the L.M.S.R. by over 12½ min., running the 152·7 miles Crewe to Willesden in 129 min. 33 sec., at a start-to-stop average of 70·7 m.p.h., and the 67·2 miles from Welton to Wembley at the remarkable mean speed, with a 475-ton trainload, of 77·2 m.p.h. With due allowance for the date of construction and the difference in dimensions and weight, however, the performance of the "Royal Scot" was not greatly inferior, as with 505 tons of train 8½ min. were regained from Crewe to Euston, an average of 69·4 m.p.h. was maintained over the 72·3 miles from Welton to Kilburn, and the Rugby-Euston section was completed in the noteworthy time of 76 min. 9 sec. A further L.M.S.R. test, from Crewe to Glasgow and back, over Shap and Beattock summits, with the same engine and almost the same load as the Crewe-Willesden test run, also gave some remarkable results, and required a fuel consumption of only 52·6 lb. of coal per mile. Such successful achievements as these and the L.N.E.R. test runs of November and March last are a good augury.

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Punctuality on the L.M.S.R.

The second run mentioned in the foregoing note may be taken as one of the effects of Mr. Byrom's punctuality campaign on the L.M.S.R., to which we have referred several times recently when commenting upon the staff journal of the L.M.S.R. Operating Department, *On Time.* In the July issue of this stimulating publication the operating staff is urged by the Chief Operating Manager to make a special effort to achieve punctuality during the summer traffic peak period. Since the inception of the Punctuality League early this year there has been a noteworthy improvement in the standard of L.M.S.R. passenger train punctuality. In making this statement, which we quote from *On Time,* Mr. Byrom frankly adds that "while this improvement has not gone as far I hope and believe it will, it nevertheless represents a sufficient advance on previous standards to show how great was the room for improvement, and how much can be achieved by united and well directed effort." We note that the Northern Division maintained its substantial lead in the express passenger train competition. Perhaps this is not surprising, for the punctuality campaign on the L.M.S.R, depends largely on individual initiative.

* * * *

The Week's Traffics

The latest traffic returns of the four group railways give the half-year's results of the L.M.S., Great Western, and Southern Railways up to June 30, but the figures for the L.N.E.R. go down to June 29. Aggregate figures for the four companies for the half-year amount, therefore, as nearly as possible to £71,725,000, a net increase of £359,000 or 0·50 per cent. Passenger train earnings of the four companies for the 26 weeks amount to £30,523,000, an increase of £692,000; merchandise receipts are £25.834,000, a net decrease of £142,000; and coal class traffics aggregate £15,368,000, a net decrease of £191,000. All the companies record gains for the half-year in passenger train traffics, but in merchandise the only increases are £30,000 on the Great Western and £10,000 on the L.M.S.R., and in coal the only advance is that of £12,000 on the L.M.S.R.

	26th Week				Year to date.	
	Pass., &c.	Goods, &c.	Coal, &c.	Total.	Inc. or dec.	
	£	£	£	£	£	%
L.M.S R. ..	+ 34,000	+ 6,000	+ 1,000	+ 41,000	+ 299,000	+ 1·04
L.N.E.R. ..	+ 5,000	—	+ 5,000	+ 10,000	— 26,000	— 0·22
G.W.R. ..	+ 25,000	+ 8,000	+ 12,000	+ 45,000	+ 78,000	+ 0·66
S.R. ..	+ 12,000	+ 2,500	+ 4,500	+ 19,000	+ 8,000	+ 0·09

London Transport receipts for the 52 weeks are £28,020,100, an increase of £592,200 on 1933-34.

* * * *

Three Months' Passenger Train Traffics

When considering the analysis of passenger train traffics of British standard gauge railways (excluding London Transport) for the first three months of 1935, which is published with the Ministry of Transport statistics for March, it should be borne in mind that the 1935 period does not include any Easter holiday figures, whereas the first quarter of 1934 did. This largely explains why the number of monthly return and period excursion passengers in the first quarter of 1935 (6,660,876) showed a decrease of 1,419,637 or 17·57 per cent., and the receipts

therefrom (£2,262,467) were lower by £588,583 or 20·64 per cent. During the first two months of 1935 the corresponding decreases were only 15,933 and £38,712, respectively, whereas in March there was a drop of no less than 1,403,704 or 36·75 per cent. in monthly return passengers and of £549,871 or 40·31 per cent. in monthly return receipts. Standard fare passengers in the first quarter of 1935 were 19,719,378, a decrease of 966,202 or 4·67 per cent., and brought in receipts of £1,297,465, which were lower by £148,905 or 10·30 per cent. On the other hand, day, half-day, and evening excursions, workmen, and "other descriptions" showed improvement both in numbers and receipts, and season tickets advanced by £48,381 or 2·30 per cent. Parcels, however, brought in £56,274 less. First class receipts (excluding season tickets) of the four group companies together showed a net increase of £8,532 in January and February, but a decrease of £20,049 in March doubtless for the reasons already explained. Southern Railway first class season tickets during the quarter increased by £7,180 or 5·39 per cent.

* * * *

Overseas Railway Traffics

Last week saw the close of the Argentine railway financial year and each of the four principal companies, as appears from the accompanying table, registers an aggregate decrease in sterling. The Entre Rios, however, shows an improvement of £8,654. In currency receipts, on the other hand, all the companies except the Buenos Ayres Western, which has a decrease of 294,000 pesos or 0·72 per cent., can show an advance. The respective increases in pesos are:—Central Argentine 5,873,850, or 5·73 per cent.; Buenos Ayres Great Southern 4,930,000, or 4·09 per cent.; Buenos Ayres & Pacific 4,465,000, or 6·68 per cent.; and Entre Rios 1,535,900, or 16·76 per cent. Traffics on the principal systems have recently been weakened by feast day celebrations which fell unusually late this year.

	No. of Week	Weekly Traffics £	Inc. or Decrease £	Aggregate Traffic £	Inc. or Decrease £
Buenos Ayres & Pacific	52nd	97,647	+ 15,395	4,182,552	− 238,564
Buenos Ayres Great Southern	52nd	111,941	− 45,325	7,353,728	− 664,957
Buenos Ayres Western	52nd	37,294	− 8,771	2,364,387	− 342,999
Central Argentine	52nd	125,950	− 4,926	6,348,277	− 492,814
Canadian Pacific	24th	474,600	+ 46,000	10,667,800	− 73,400
Bombay, Baroda & Central India	9th	234,150	+ 1,200	1,950,675	+ 5,100

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Railways and the Royal Show

The arrangements made by the railways for handling traffic to and from the Royal Show at Newcastle-on-Tyne, which finishes tomorrow (July 6), are characteristic of those entailed by other large agricultural events during the summer. Livestock exhibits have to come to Newcastle from as far afield as the west of Cornwall, together with a great variety of impedimenta. Apart from the special provision made by the railways for the smooth delivery and subsequent despatch of this traffic, which has extended to the erection of a temporary office for clerical staff at a cattle dock and the allocation of three sidings in a mineral yard to the business of the show exclusively, assistance has been furnished inside the show grounds themselves. Here, 14,400 sleepers have been loaned to make paths for heavy vehicles, and a 7-ton steam traction engine crane and a 30-cwt. petrol runabout crane are on duty. Mechanical units are being used exclusively for the conveyance of exhibits and implements to and from the ground. If these facts are as widely known as they should be, the main line companies' inquiry office at the show will have a busy time dealing with visitors anxious to put their affairs into the hands of such comprehensive contractors.

Egyptian Delta Light Railways

Increasingly severe competition from motor vehicles was experienced by the Egyptian Delta Light Railways during the year ended March 31, 1935, notwithstanding the low rates and fares at which goods and passengers were carried over the company's lines. Steps are now being taken by the directors for the inauguration of a motor transport system to be worked in co-ordination with the existing rail services. In passenger traffic there was an improvement both in numbers and receipts, but though goods tonnage increased, the receipts therefrom were £3,595 lower. Building materials, cotton, and grains and pulse provided the principal traffics. In working expenses there was a reduction of £3,335 notwithstanding the heavier traffic.

	1934–35	1933–34
Passengers	11,393,611	9,968,835
Goods, tons	601,899	571,591
Average miles	622	622
Operating ratio, per cent.	77·26	79·85
	£	£
Coaching receipts	150,610	143,253
Goods traffic receipts	85,484	89,079
Gross receipts	240,431	236,793
Working expenses	185,751	189,086
Net receipts	54,680	47,707

A sum of £4,000 is transferred to reserve against capital expenditure, and a dividend of 1 per cent. is recommended on the preference shares, the same as for the previous year.

* * * *

L.M.S.R. Anniversaries

The L.M.S.R. has excelled itself this week with a golden jubilee on Monday and a centenary on Wednesday. The jubilee was that of the "West Coast Postal" Royal Mail express, which was inaugurated on July 1, 1885, between London and Aberdeen over the L.N.W. and Caledonian Railways, and has ever since left Euston nightly, Sundays included, at 8.30 p.m. No passenger coaches are included, and the train, which usually consists of twelve vehicles, makes extensive use of ground exchange apparatus for picking up and dropping mails while travelling at speed. Wednesday's centenary, however, is no less important, for it marks the passing of the Act which gave the London & Birmingham Railway powers to establish its London terminus at Euston Square. Actually the station, which cost £35,000 and was built to the design of Mr. Philip Hardwick, was not brought into use until two years later. After nearly a hundred years Euston still stands like "the entrance gates to a Grecian city or temple." That description in 1837 was sincere praise; today some use such terms in mirth.

* * * *

A "Northern Belle" Sixty Years Ago

It is sometimes assumed that the Northern Belle is Britain's pioneer cruising train; yet our first venture of this kind set out from London one day in the mid-seventies on a 26-day cruise over a route even more extensive than that traversed by its descendant. This "Northern Belle" of sixty years ago consisted of two American Pullman cars and a Midland van. One of the Pullmans was fitted for day use, and among its comprehensive furnishings was "a piano, by Chappell." The second car was a sleeper. The van contained stoves where meals were cooked for the passengers, and tubs in which they revelled every morning. We are informed that the personnel of the train consisted of "seventeen ladies and cavaliers, four servants, two guards and a porter." The train started from St. Pancras, and made stops at Matlock, Buxton, Melrose and Edinburgh. It was then carried across the Forth

on the Burntisland train ferry, after which it proceeded to Perth via Ladybank. Further stops were made at Birnam, Killiecrankie, Kingussie and Inverness. The next lap took the train to the terminus of the Skye railway—then Strome Ferry. From there it returned to Dingwall, and ran north to Thurso and Wick. The return journey to London was made via Glasgow. The carriages were put into sidings at the stopping places, and the passengers made the train their permanent holiday home. Much local excitement was raised by the appearance of the train, and the curious crowds who gazed through the carriage windows called the travellers "Yankees."

* * * *

Air Conditioning

To secure almost the same temperature everywhere in a carriage supplied with artificially heated or cooled air, it is necessary to maintain a comparatively rapid flow through the carriage, removing air but recently introduced and still possessing much of the beneficial warmth or coldness that special, and by no means costless, measures have been taken to give it. In circumstances where the air removed retains in a large measure its original purity, it can be recirculated, and very great savings in steam heat or mechanical power can so be achieved. American conditions permit recirculation, but they differ from the conditions encountered in these islands in that the tobacco smoking passenger is the exception in America, rather than the rule, so that he does not expect or obtain the freedom of more than a very small part of the train. It is doubtful if recirculation could be used to the same extent where British habits prevail, for, as is shown by an article elsewhere in this issue, pollution of the air in a carriage is cumulative, and tends to a higher limit where the air is recirculated, or where, alternatively, the fan capacity is meagre. This difficulty should not, however, cut us off entirely from the benefits enjoyed by our American cousins. If whole trains may not at present be air-conditioned, sleepers, dining cars and Pullmans could be equipped with the necessary apparatus, and the relative inefficiency entailed by the absence of recirculation could be tolerated even in this age of notorious pinching and scraping, provided only one or two such cars were included in a train.

* * * *

Passenger Handling in Victoria

We commented on page 1046 of our issue of December 28 last on some of the remarkable feats of passenger handling achieved by the Victorian Railways round the city of Melbourne in connection with the visit of the Duke of Gloucester. On October 18 last all suburban traffic records were broken and some interesting detail figures are now to hand. Passengers handled on the Melbourne suburban system on that day numbered in all 1,092,350; 1,977 trains were signalled on the various lines through Jolimont yard, and 1,383 train movements were handled at the viaduct end of Flinders Street station. At the peak, between 12 noon and 2 p.m., 204 trains were dealt with, averaging one train every 36 seconds. On November 11 special trains were run from all over the State into Melbourne for the service of dedicating the Shrine of Remembrance, and again between 400,000 and 500,000 passengers were dealt with, one hundred trains being added to the normal Sunday service. A minor operation was that of transporting 16,000 children by rail from 143 different schools to Jolimont and Richmond on October 19, for a physical culture display, in 29 trains, 19 of which were specially run. Melbourne Cup Day is annually an event which throws considerable responsibilities on the railway administration; on the last occasion 15 electric trains were specially rostered to run non-stop between Flinders Street, Spencer Street, and Flemington racecourse; and 100 such return trips were made, resulting in a service at 2-min. intervals over the section between Newmarket and Kensington.

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South African Railway Research

Dr. C. V. Von Abo, Research Engineer South African Railways and Harbours, read an interesting paper on "Scientific Research on the South African Railways" at a recent meeting of the South African Institution of Engineers. The author stated that as a result of improved methods and the use of new tools, jigs, and up-to-date machinery in the mechanical workshops, it is estimated that since 1928 a saving of approximately £116,500 has been effected, whilst the percentage of steam locomotives under and awaiting repairs has steadily decreased from 16·0 per cent. in 1922-23 to 7·5 per cent. in 1934-35. Similarly the average number of days that steam locomotives were under repair has been steadily reduced from 76 to 38 in the corresponding period, and, whereas the average costs per output for locomotives, coaches, and goods stock were respectively £1,337, £429 and £80 in 1928-29, by 1933-34 they were down to £1,167, £276 and £49. The amalgamation of three different railway systems at the time of the Union in 1910 was largely responsible for the many classes of locomotives and goods wagons then in service on the South African railways, but after the most careful consideration it was decided that twenty-nine of the locomotive classes were worthy of heavy repairs in future whilst the others could be scrapped when such attention fell due. Careful investigation enabled the Chief Mechanical Engineer to design only three types of efficient boilers, from among which any of the twenty-nine classes retained could be equipped after certain modifications.

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Train Loads and the Locomotive

Mr. Robert S. Binkerd, a Vice-President of the Baldwin Locomotive Works, in the course of a paper which he read before a meeting of the New York Railroad Club recently, remarked upon the increasing train loads nowadays allotted to locomotives which are not of recent construction. Most of the passenger locomotives in America are of the 4-6-2 type and were, when built, supposed to be adequate for hauling ten-car trains when the average weight per vehicle was 65 to 70 tons. Today, however, the average weight of the cars is about 85 tons and the same engines are not infrequently given eleven to fourteen of these heavier vehicles to haul. Consequently, instead of having 700-ton trains to deal with, the locomotives are called upon to handle trains weighing from 1,000 to 1,200 tons. When it is remembered that the acceleration of a train depends on the ratio between the tractive force of the locomotive and the deadweight of the train, it can be readily seen why it takes longer to work the trains up to speed and why the maximum speed has been materially reduced. The passenger schedules of the future, Mr. Binkerd went on, will be largely determined by controlling the average or maximum deadweight behind the tender. As new passenger train vehicles are built there will be substantial reductions in their weight without losing any of the standards of safety which have been established by past experience, whilst the cars will be completely interchangeable with those already existing. As a result a train can be made up of a number of combinations of new and old vehicles and it will be possible to increase the capacity of any train without correspondingly increasing its weight by the simple expedient of augmenting the proportion of new and lighter vehicles in the total train load.

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1935 Review of Railway Charges

THE judgment of the Railway Rates Tribunal in connection with its recent review of the standard and exceptional charges of the four amalgamated companies generally follows the lines expected. The tribunal remarks that the slight recovery in gross receipts from railway working, which began in the middle of 1933, was maintained throughout 1934, with the result that the gross receipts showed an improvement of £5,811,037 compared with 1933. This increased traffic naturally involved a substantial rise in railway working costs and, in fact, these amounted to £3,561,331 more than in the previous year, and the result of the working during 1934, after bringing into account revenue from other sources, was that the net revenues of the four amalgamated companies increased by £2,676,553 as compared with 1933. Comparative figures are then quoted of the variations in railway traffics, gross receipts, railway working expenses, and the revenues from other sources during the last four years. These show that, compared with 1931, the number of passengers carried by the four group railways rose by 18,170,233 or 1·53 per cent. in 1934, while the tonnage conveyed by merchandise trains increased in the same period by 590,696 tons or 0·18 per cent. Railway gross receipts declined by £7,100,498 or 4·64 per cent. between 1931 and 1934, while railway working expenditure was decreased by £5,655,170 or 4·40 per cent.—a creditable achievement. Between the same years the companies' revenue from other sources decreased by £444,492 or 5·00 per cent., but while there was an increase of 0·12 per cent in the case of the L.M.S. Company there was a drop of 11·28 per cent. on the Great Western, mainly owing to the low return earned by its dock undertaking. Finally, the net revenues of the four companies in 1934 were £1,889,820 less than in 1931, only one company, the Southern Railway, showing an increase, which amounted to £192,461 or 3·43 per cent.

The net revenues earned by the companies in 1932, 1933 and 1934 totalled £26,425,193, £28,804,163 and £31,480,716 respectively, as compared with the standard revenues and allowances granted up to December 31, 1933, to remunerate additional capital raised or provided in respect of expenditure on capital account incurred since January 1, 1928 of £51,299,867. Thus the net revenues for 1934 were £19,819,151 or 38·63 per cent. less than the standard revenues plus the above mentioned allowances, while the average net revenues for the last three years were £22.396,511 or 43·66 per cent. less. There being a deficiency in the case of each company by either method of calculation, the tribunal had to consider whether this was due to lack of efficiency or economy in management. No such suggestion was made by either of the trading interests appearing at the review, and the tribunal, after hearing the companies' evidence and considering the financial and other statements submitted, expresses the opinion that the deficiency arose from the same causes as in 1933, viz., the depression in trade, reduced spending power of the population, competition of other forms of transport, and in, some measure, the political difficulties which exist between the Irish Free State and this country.

In considering whether, owing to change of circumstances, the deficiencies are likely to continue, the tribunal feels that there are no indications at present that the gross revenues of the four companies are likely to be materially different from those of last year. On this assumption, and leaving out of account any alteration there may be in the liability of the respective companies for local rates, the tribunal does not consider there is likely to be any substantial reduction in railway working expenditure as compared with 1934. It points out that while further economies in working and management may be anticipated, additional payments to the staff in respect of the partial restoration of reductions in wages and salaries made in 1931 will amount to about £1,000,000 during 1935, consequently it does not anticipate any material improvement in the net revenues of the companies during the present year or that the deficiencies are not likely to continue.

In these circumstances the duty of the tribunal is to make such modifications in the standard and exceptional charges as it thinks necessary to enable the companies to earn their standard revenues. The companies reiterated, however, that they do not consider any such modifications would achieve the desired object, and the Mining Association and the British Iron and Steel Federation, while pressing for a reduction in railway rates on coal, iron and steel traffics, did not contend that any such reduction would improve the net revenues of the companies. On the other hand, the companies intimated that whenever additional net revenue could be secured by the reduction of charges, exceptional rates were introduced and, during the seven years ended December 31, 1934, no fewer than 920,000 exceptional rates had been adopted, 800,000 of which were in respect of traffic by merchandise train, and the balance by passenger train. Further, during the year, 148 agreed charges covering 750 traders (599 of whom were registered pig curers) had been approved, and the companies estimated that these were responsible for 1·66 per cent. of their railway revenue from merchandise traffic, or £1,500,000. In these circumstances the tribunal did not feel disposed to order any variations in the charges. In connection with the London & North Eastern Company's claim for an allowance under Section 59 (4) of the Railways Act, 1921, to remunerate that portion (£100,000) of the capital raised by the issue of £3,000,000 4½ per cent. sinking fund stock which has been redeemed, the tribunal is inclined to the view that the whole of the additional capital raised and expended is entitled to an allowance, notwithstanding that some part of the stock issued has, in accordance with the terms of issue, been redeemed. In order to give railway users an opportunity of considering the subject which, at the moment, is largely academic, the tribunal ultimately decided to defer judgment on this issue until the next annual review.

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Railway Rates for Small Parcels

THE announcement by the four group companies of the introduction of reduced scales of owner's risk charges as from July 1 for the conveyance of parcels weighing up to 15 lb. by passenger train is a direct result of the concessions made by the Post Office in the parcels post rates and the extension of the weight limit for Post Office parcels from 11 to 15 lb. For a number of years the railway owner's risk parcels scale has, with minor exceptions, been at a somewhat lower level than the parcels post scale, but the alterations made by the Post Office as from July 1 largely nullified this position. In addition, official press announcements have made it clear that the postal authorities intend to canvass actively for this class of business in future. While no statistics are available showing the number of parcels conveyed by the companies which are less than 11 or 15 lb. in weight, there can be no doubt that they represent a very substantial proportion of the 92,000,000 parcels conveyed by the railways during 1934, from which a gross revenue of about £6,750,000 was earned. It would be impracticable for the companies to effect any reduction in their working costs which would be at all proportionate to any loss in parcels traffic which might be experienced, and, having regard to

the magnitude of the revenue involved, the companies felt that they had no alternative but to reduce their parcel rates to such a level as would approximately maintain their former relativity to the pre-July parcels post rates.

In connection with this reduction the companies also had regard to the representations which have been made from time to time that the existing ten mileage gradations should be simplified in order to meet trading requirements, and the new scales are noteworthy for the fact that they contain only two mileage gradations, one being in respect of distances up to 30 miles and the other in respect of all distances over that figure. These scales, which will apply between all stations in Great Britain, including the Channel Islands and the Isle of Man, where through bookings are at present in operation, represent a material advantage to the public, especially when it is appreciated that the rates cover not only conveyance but also collection and delivery at all places where these services are usually performed. The reduction in the number of mileage gradations is not an entirely new principle in connection with the charging of small parcels for conveyance by railway, as a somewhat similar arrangement was in force over ten years ago, but this did not provide also for weight gradations of one pound, as does the existing scale, and consequently it did not adequately meet public requirements and was soon replaced by the more comprehensive scale which, in turn, has been superseded since July 1.

It should not be overlooked in connection with the conveyance of railway parcels traffic that the companies also facilitate trade by allowing reasonable credit facilities in order to permit of the dispatch of parcels immediately they are ready, without the necessity for making immediate cash payments. Further, practically no limitation is placed on the size or weight of the packages which may be handed them, and a record is kept of every parcel forwarded so that proof of delivery may be given if required. By means of their express passenger train services a large proportion of the railway parcels traffic is delivered on the day of dispatch, or is available for delivery in any part of the country not later than the morning following dispatch. The railway companies therefore hope that the continuance of these prompt services, combined with the attractions of the reduced and simplified rates, will prove of valuable assistance in the development of that growing number of trades which depend on rapid, reliable and cheap transport for the creation and extension of their markets.

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Railway Building in Iran

IN our issue of October 13, 1933, we published a brief outline of the Trans-Persian or Trans-Iranian Railway project as it then stood, and as recently as March 29 last, we had occasion to refer to the progress of the construction work on the Southern section of the line from Bandar Shahpur, on the Persian Gulf, northwards. On the northern section also work is going ahead rapidly. In fact, the line is open from Bandar Ghaez or Bandar Shah, the adjoining seaport on the Caspian, to Chirgha at the foot of the Elburz Mountains, through which very heavy construction work has already been pushed so far as to permit of platelaying being started in the autumn, with the idea of opening for traffic as far as Firouz-Kouf —which is well on the Iranian High Plateau—by the end of the year. Meanwhile, construction work has been in hand about a year on the remaining easier section of line to Teheran.

Much of the construction of the southern section is in even more difficult country than that encountered on the Elburz ascent. It has been split up into 8- to 10-mile contract lengths, many of which have been let to Persian, Italian, French, Belgian and also, lately, to two British firms, Edmund Nuttall Sons & Co. Ltd. and John Mowlem & Co. Ltd. (Joint) and Richard Costain Limited. We understand, however, that there are still some contracts to be let, and it may be worth the while of other British firms to consider tendering. Tenders are, it is understood, called for by the Kampsax Consortium on behalf of the Iranian Railway Ministry, as this Danish syndicate is responsible for the supervision of the entire work. So heavy is the work in the Louristan mountains that there are not even mule tracks, and the construction of service roads entails much blasting: frequent gorges with precipitous sides rising sheer 200-300 ft. have to be crossed. Good stone is, however, available for masonry over much of the new route, and a large proportion of the Louristan section of the line will be in tunnel. Such are the conditions that would-be contractors may expect to find on the remaining portion of the southern part of this very costly construction work.

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The Level Crossing Problem in Spain

THE level crossing question has been attracting a great deal of attention in most countries in recent years, due to the changed conditions produced by the development of motor traffic having modified, or in some cases reversed, the relative importance of rail and road at many crossings. In the past, when an accident occurred at a crossing, the road vehicle as a rule sustained practically all the damage, but now that certain classes of motor vehicle have become quite heavy, there is considerable risk of damage being done to the train, as some recent mishaps have in fact demonstrated. The increasing use of railcars is not without effect in this respect, for a collision between a railcar of light construction and a heavy lorry fully loaded, might easily result in the railcar suffering the greater damage. The question has been dealt with recently in our contemporary *Ferrocarriles y Tranvias* by the Engineer to the Operating Department of the Madrid Metropolitan Railway, Señor P. de Cuadra y Pinzon, following a lecture delivered by him before the Association of Industrial Engineers. In 1930, as reported in our issue of February 5, 1932, a committee was appointed in Spain to consider the subject. Its report, made two years later, recommended that certain steps be taken immediately to improve matters, but the proposals were not marked by any originality. Señor de Cuadra, as a result of his experience with modern signalling apparatus on the Madrid-Metro has developed some ideas for signalling level crossings by special devices designed to afford practically as much security as is obtainable when two railway routes cross on the level, and we give below the substance of his suggestions.

It is not only the danger of level crossings which provokes demands for their abolition. Almost all the danger could be eliminated by exercising reasonable care. The delays experienced by road users contribute quite as much, if not more, to these demands. In addition, gates, unless of very substantial construction, do not afford complete security, the lighter type of Continental lifting barrier being smashed through without much difficulty when road vehicles are driven carelessly into them, which often happens. Unfortunately, at the present time, road drivers are nothing like so well disciplined as those of the railway, and their sense of responsibility is much smaller. This is an important element in the problem. The use of light signals without barriers is becoming common in many parts and gives a fairly high degree of safety if observation of the signals can be relied on. But there is no reciprocal control, and no provision of signals on the

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railway to guard against anything being wrong on the road, or on the crossing itself. Señor de Cuadra considers it essential to provide for this, and so to interlock, as it were, in a definite manner the two classes of traffic. While admitting that rail traffic must be considered to have the preference, he proposes that a passing train should never impose a longer wait on road users than three minutes. On this basis his signalling scheme is worked out in the following way.

Light signals, including distant warning signals, would be provided on both the railway and the road, normally allowing road traffic to pass. In order to prevent that traffic being held longer than necessary it is proposed to instal three rail treadles at certain intervals in the rear of the crossing, connected to time element relays and so arranged that the signals at the crossing are not set against the road until absolutely necessary, according to the speed of the approaching train and hence the time it will take to reach the crossing. It will not receive clear signals until the road traffic is effectively stopped, to make certain of which special apparatus is suggested. Barriers not being considered necessary, it is proposed to instal an arrangement which will raise a row of spikes across the road, capable of inflicting considerable damage to tyres, if a road vehicle actually ran past signals at "stop," to detect which action treadle mats, similar to those used for vehicle actuated street signals, would be installed. To eliminate as far as possible even then the damaging of vehicle tyres, an additional apparatus, capable of making an artificial dip in the road when the signals are at "danger" would be installed, on going over which a driver would be forcibly warned that he was over-running a signal, and would still be able to pull up short of the spike apparatus, unless he were grossly negligent.

These proposals cover most of the contingencies usually met with, but there still remains the possibility that a road vehicle might begin to cross under correct conditions and then become stalled on the crossing, as pointed out in an editorial note in our issue of February 22 last, so constituting a great danger, especially at night. Señor de Cuadra suggests the possibility of constructing what may be called a road "track-circuit," by making the surface of the crossing into a kind of large treadle mat or pad, operated by a wheel on any part of it. With this addition the scheme becomes a comprehensive one designed on the basis of treating each class of traffic as requiring equal protection from the other and assimilating road signal working to that of the railway. Signals to govern traffic at street intersections are now an established thing, and the principles used with them, in the latest examples, point the way to some solution of the crossing problem, such as Señor de Cuadra has sought to evolve. The idea of making a kind of automatic stop to hold road vehicles back has already been developed into practical form in America, and was described in an editorial note in our issue of October 6, 1934. Señor de Cuadra, however, hopes that his spike plate will have considerable moral influence on road drivers, which would appear to be necessary since he says, "In Spain everyone feels an irresistible desire to do the opposite to what is ordered by regulations; hence we consider that level crossings protected by signals alone constitute a danger."

* * * *

The Argentine Government Railways Committee

THOUGH we published in our issue of May 17 a general précis of the report of the Railway Investigation Committee appointed by the President of the Argentine Republic, it may be useful to tabulate the recommendations it contains. The committee recommends:—

(*a*) The fixing of a special exchange rate for railway remittances, so as to reduce losses under this head, at least as regards payment for materials.
(*b*) The division of the lines into two categories, so as to exempt those with a minimum amount of traffic from the technical obligations imposed on the others.
(*c*) The closing of unremunerative stations and lines; the latter to be replaced by omnibus or railcar services.
(*d*) The institution of competitive tariffs where road competition exists.
(*e*) Also a door-to-door service by means of motor lorries in combination with the railways.
(*f*) The revision of the railway regulations with a view to suppressing unnecessary requisites which tend to hamper operation and increase the cost of working.
(*g*) The reduction of the number of level crossings provided with barriers.
(*h*) The readjustment of competitive tariffs as between companies.
(*i*) The suppression of "special tariffs."
(*j*) The regulation of river transport and co-ordination of the same with the railways.
(*k*) The increase in the special rates payable on Government goods and materials.
(*l*) The modification of the labour regulations, in order to enable the staff to be utilised to better advantage, with a view to obtaining a higher output within the fixed working hours, and lastly
(*m*) Authority to merge different companies, so as to reduce overhead expenses and improve the services.

Further reflection upon the text of the report tends to emphasise the broad outlook of this committee which was composed entirely of Argentinos, representing the commercial, agricultural and financial interests of the nation as well as railways. This is especially noticeable in the frank admission of the right of the foreign shareholder to a remunerative return upon his capital invested in Argentine railways. It is also satisfactory to note that the indispensability of the railways in the country's industrial development is not overlooked, in spite of the present ubiquity and popularity of road transport.

Letters to the Editor

(The Editor is not responsible for the opinions of correspondents)

The L.M.S. Turbine Locomotive

London, S.W.1.
June 29

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In your editorial comment on the design of the new L.M.S. turbine express engine in the current issue of THE RAILWAY GAZETTE, it is stated in effect that the advantages of the turbine system as applied to locomotives include "an approximately double torque at starting." I must confess I do not follow this, although I can, of course, quite readily appreciate your meaning in so far as the other advantages named in the article are concerned.

I should be glad if you would kindly elucidate the point as I feel certain that others as well as myself will be to some extent mystified by the statement.

Yours faithfully,

H. K. ZANOS

[The torque exerted by a turbine when starting is approximately double that when running at normal speed, and this is mainly due to two reasons. The first is that the angle of impulse of the steam on the blades is very much more acute at starting than it is when running, hence the change of velocity of the steam is greater under the former condition, and since the force on the blade is proportional to the change of velocity the torque is greater. The increase of torque due to this is usually in the neighbourhood of one and a half times. The remainder of the total increase is accounted for by the fact that at starting the nozzle chests are exposed to the full boiler pressure and hence the turbine is receiving the benefit of the maximum nozzle effect.—ED., *R.G.*]

PUBLICATIONS RECEIVED

Locomotives. By A. Morton Bell. London: Virtue & Co. Ltd., 19-21, Thavies Inn, Holborn Circus, E.C.1. Vols. I and II. 11¼ in. × 8¾ in. × 1¼ in. 431 pp. combined. Price: Complete set, 37s. 6d., or by small monthly payments.—This is a comprehensive and thoroughly up-to-date work deserving a wide circulation. It bears throughout its pages the stamp of authority without being too technical in style, so that no student of the locomotive subject should find any difficulty in following the descriptions given of locomotive design, construction, maintenance, and all the other aspects of the subject with which it deals. If it were merely a treatise concerning the locomotive as a piece of machinery, and restricted to an explanation of the various parts and their functions, we should have felt disposed to question the necessity of yet another work of the kind. The present one, however, goes very much further than that and is, virtually speaking, an encyclopedia covering all phases of locomotive engineering, including workshop practice, the machining and assembly of the different component parts, accessories of the usual and, in some cases, less familiar kind, lubrication, feed-water heating and treatment, combustion and fuel, repairs, running faults and failures, and a section dealing with special types. There is a chapter on internal combustion and electric locomotives which is sufficiently up to date to include such vehicles as the Micheline high-speed pneumatic-tyred railcar, and another chapter on "Modern Types of Locomotives."

The work is international in character, and numerous half-tone illustrations and drawings are given of various foreign locomotives and vehicles, including several built in this country for service abroad. Some of the more interesting types of engines, including the L.N.E.R. No. 10000, *Cock o' the North*, are given large size illustrations in colour, or folding plates with sectional black and white drawings. In the frontispiece to Vol. I there is a folding plate portraying a "Lord Nelson" class 4-6-0 express locomotive of the Southern Railway in sectional elevation, coloured and numbered, the names of the parts being tabulated below the illustration opposite the corresponding numbers.

Both the volumes are copiously illustrated with half-tone reproductions and line drawings, many of the latter in section or part section. A work of this kind would be incomplete unless it were fully illustrated, and the illustrations should in all cases be as good as it is possible to make them. In this respect, unfortunately, the volumes fail in some measure to reach the desired standard. Many of the more intricate drawings, such as that of the Löffler engine on p. 38 and the Russian Garratt on p. 365, to mention only two, are not by any means as clear as they should and might be, whilst the same can be said of a fairly high percentage of the half-tone blocks. The explanation in regard to the latter may be that they were reproduced from blocks which had already seen a fair amount of service, but it is a pity, especially as the text matter is so exceptionally clear and the paper used of good quality. We nevertheless commend these volumes to everyone who wishes to make a thorough study of the locomotive engine in its many aspects, and principally the orthodox forms of reciprocating steam locomotives.

As Mr. A. C. Carr, the President of the Institution of Locomotive Engineers, remarks in his foreword, "a work of this description must be of great value to all railway locomotive staffs in any country, and, indeed, to all railwaymen and the general public who may be interested in the steam locomotive and its competitors." The author, it must be remembered, has used the practical experience gained over a period of 50 years in the design, manufacture and operation of steam locomotives.

The Mechanics of a Locomotive on Curved Track. By the late S. R. M. Porter, M.A., A.M.I.Mech.E., A.M.I.Loco.E. London: THE RAILWAY GAZETTE, 33, Tothill Street, S.W.1. 12 in. × 9 in. 32 pp. Illustrated. Price 5s. net.—The behaviour of a vehicle passing round a curve at speed, and the forces produced on the wheels and rails by its passage, is a problem in railway mechanics that does not lend itself easily to solution. It is, moreover, a problem of the greatest importance to all departments of railways seeking to obtain longer life from tyres and rails and to work their trains at the highest speeds compatible with safety. This publication, a reprint of a paper published serially in *The Railway Engineer* and THE RAILWAY GAZETTE, is a development of Ubelacker's well-known work on the subject, which it carries to a conclusion. For it the author, whose tragically early death is an irreparable loss to railway engineering, received the George Stephenson Award of the Institution of Mechanical Engineers.

The author considers a locomotive of any wheel arrangement as a number of trucks linked together, a truck consisting of any number of wheel pairs held parallel in one frame. He shows that the forces at the wheel treads determine the position of the centre of the friction, and that this can be calculated from the equations of motion of the truck. For a truck to be in equilibrium, the resultant of all frictional forces at the wheel treads plus all other known forces, such as tractive force and centrifugal force, must be equal and opposite to the resultant of the flange forces acting at those wheels of which the flanges are in contact with the sides of the rails.

A truck of normal design can run in two ways—with one flange only in contact with the rail, or with two flanges in contact so that its position relative to the curve is positively determined. These cases are termed "free" and "constrained" curving, and there is no doubt in any particular case which will occur. A manifestly impossible solution will result if the wrong equations are worked out. In all cases, however, the solution of the equations of motion depends on the values given to the coefficient of friction between wheels and rails. In the absence of exact knowledge the author has used two hypotheses, that of "sliding," mainly used on the Continent, and the "creep" hypothesis supported by Carter in England. The experiments of the Dutch and German Commission to investigate friction between wheels and rails seem to show that the value of the coefficient varies. On curves of large radius, where little relative motion takes place, creep occurs, while sliding is found on sharp curves. An exact determination of the value of this coefficient will render the paper of great practical significance as a means of improvement in locomotive design, and particularly in the design of high-speed locomotives and railcars.

Ventilating Equipment.—James Keith & Blackman Co. Ltd., 27, Farringdon Avenue, E.C.4, has issued an illustrated folder drawing attention to the benefits accruing from the scientific ventilation of workshops and offices, and showing suitable fans for the purpose. Another folder illustrates oil film filters for air purification. These are supplied as separate cells, each with a capacity of 750 to 1,000 cub. ft. of air a minute, and are arranged for assembly in banks of any required size. It is easy to install these complete air-filter units in situations offering limited space. Air-heater units are described in a separate leaflet. They are adaptable for suspension from roof members or for mounting in front of ports in outer walls or above open doorways. The heaters, which incorporate a fan and enclosed motor, will also handle steam at pressures up to 150 lb. per sq. in., and hot water.

Plating Rectifiers.—The process of electro-plating requires a high value of current and a low voltage, conditions of output under which the d.c. generator is least efficient. High efficiency static rectifiers, such as the apparatus described in this new booklet published by the Westinghouse Brake & Signal Co. Ltd., 82, York Road, King's Cross, N.1, have the advantage not only of greater technical suitability, but of negligible upkeep requirements compared with mechanical converters. The rectifiers are of the Westinghouse metal type, and the booklet explains their characteristics and shows the connections required for building up a complete plating equipment. Where the current output is 250 A. or over, a fan driven by a squirrel cage induction motor is incorporated in the rectifier for cooling purposes, permitting its size to be reduced compared with the area necessary when there is no forced system of heat dissipation.

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THE SCRAP HEAP

The mother being indisposed, it devolved upon the father, a locomotive fireman, to feed their infant son, aged two years, with a spoon.

Hearing the child spluttering and apparently choking, the mother came hurrying in to see what was happening. The father explained that he always "led off with one under the firedoor, then one left, one right, and one well down the far end." The "far end" in this case corresponded with the unfortunate child's throat.

* * *

QUAKERS AND THE RAILWAYS

One of the remarkable proofs of the foresight and shrewdness of the Quakers is furnished by the part they played in the introduction of railways. Friend John Ellis, of Leicester, who promoted the Leicester and Swannington Railway (1830) which was the nucleus of the Midland Railway, was chairman of that company from May 7, 1849, to March 3, 1858. He was succeeded by his son, Edward Shipley Ellis, who was Chairman from May 20, 1873, to December 3, 1879. Williams, in his "History of the Midland Railway," has an interesting anecdote concerning these two railway pioneers :—

"The Leicester and Swannington line was commenced about the latter end of the year 1830 : and one spring morning in 1832 Mr. (John) Ellis said to his son, 'Edward, thou shalt go down with me and see the new engine get up its steam.' The machinery had been conveyed by water from Stephenson's factory at Newcastle-on-Tyne to the West Bridge Wharf at Leicester ; it had been put together in a little shed built for its accommodation ; it was named *The Comet* ; and it was the first locomotive that ever ran south of Manchester."

* * *

A workman at St. Rollox (L.M.S.) works, Glasgow, the other day found a thrush's nest containing five eggs—all unbroken—under a carriage. The vehicle had been sent up from Bedford for repair. Surely no better proof of the smooth running of modern rolling stock is desired !

* * *

On February 27 Mr. Pease implored the House of Commons not to pass any Bill for railways, unless they were confined to some fixed breadth between the rails. The next day he moved for a Select Committee to that end. Sir H. Verney moved, as an amendment, the appointment of a Royal Commission for railways and canals. Both the motion and amendment were lost. With respect to Mr. Pease's motion the House never committed a more lamentable error than it did in rejecting it; and when it is much too late it will be found out. These undertakings are entered into for private gain, no doubt, but the public convenience ought surely to be consulted too. The having of different gauges will be nearly as inconvenient to the traveller, as if his journey was broke down into as many different modes of transit.—*From "The Railway Magazine" of April,* 1837.

* * *

A correspondent reminds us of the truth of the old saying that a chain is only as strong as its weakest link by the following examples of how a junior railway draughtsman disturbed the serenity of an otherwise smooth-running organisation. In preparing a plan on which a derelict siding to be taken up and removed was to be indicated by a certain colour, he inadvertently applied that colour to an adjacent siding serving a colliery and in regular use. Since those charged with executing the instructions on the plan considered that it was "their's not to reason why ; their's but to do or die," the wrong siding was consequently removed with full official obsequies, and it was left to a higher power to explain its disappearance to the bereaved colliery management on the morrow.

On another occasion the same genius was instructed to prepare a plan of a derailment. Possibly because his duties also included the drawing of plans of sites where renewals or new works were envisaged, the fruit of his labours was found on completion to be headed, "Site of Proposed Accident."

* * *

THE KING'S TIME

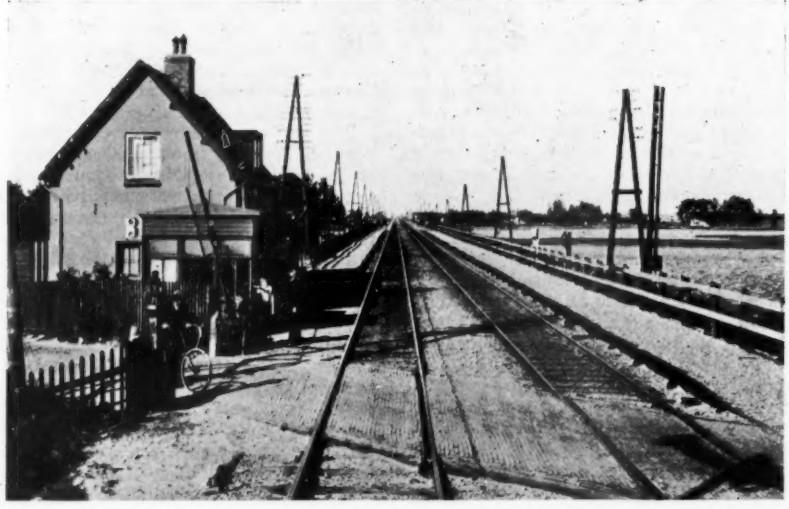
Passengers on the trains of 1837 used to see a horseman gallop at full speed into Euston station—we do not read that he was ever delayed on the way by horse or equipment failing—perhaps romance forbids mention of such a catastrophe. This horseman was an Admiralty messenger. He did not carry sailing orders or secret naval plans—not quite so romantic a person was he—but merely hurrying to hand over to the guard of the Irish Mail a watch which had been set to correct Greenwich time.

The guard took the watch to Holyhead, gave the time to the Kingstown boat, and sent it back by the Up Mail to be readjusted at the Admiralty. In spite of telegraph and telephone, despite electric synchronisation of clocks and the advent of broadcasting, the Irish Mail still brings the King's Time to Holyhead. The messenger does not gallop into Euston, maybe he travels by tube, but he does daily hand to the Overseer of the Travelling Post Office that old fat turnip watch in its leather case, and at Holyhead it is delivered to an official who comes on to the platform to receive it. Laugh if you will ! But it is carried to the Post Office, wound up and handed back to the Overseer on the Up Night Mail. The watch goes, but whether or not it keeps good time, I do not know. One thing, though, it plays its important part in one of those seemingly insignificant customs which make this country so attractive to those who do not know it and us.—*From "The Romance of the Irish Mail," by G. J., in the "L.M.S. Magazine."*

* * *

ST. PANCRAS STATION, BELIEVE IT OR NOT !

The accompanying photograph shows a wayside station situated on the Netherlands Railways between Alkmaar and Heerhugowaard Junction, which is shown on maps and in timetables as "St. Pancras." The nameboard, however, is spelt in full, and the Dutch "Sint" rather alters the effect. Even so, it is a little difficult to visualise a Stanier 4-6-0 halting here and, for that matter, an 1873 Beyer Peacock copper-domed 2-4-0 might create an even greater sensation in the London terminus! Incidentally, the photograph was taken from the rear balcony of the last coach of a train hauled by No. 914, one of the 2-4-0's in question. This is probably the only remaining passenger service for which these gallant old warriors are used.



[Photo] *St. Pancras station, Netherlands Railways* [George Grigs

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

ARGENTINA

The Future of the Cordoba Central Railway

Rumours of the impending purchase by the Argentine Government of the Cordoba Central Railway—to which editorial reference was made in THE RAILWAY GAZETTE of February 1 last—have been revived in local railway circles. Exactly how far there is any foundation for these reports it is difficult to learn, but despite repeated denials by the Minister of Public Works the impression seems to be gaining ground that something of the sort is contemplated in the not very distant future. It is possible that the present low quotations for Cordoba Central stock might be an inducement to purchase the concern under what, from the point of view of the Government, would be very advantageous conditions. It is stated that the purchase price has been fixed at £8,500,000 to be covered by an issue of debentures with interest at 4¾ per cent. per annum, payable in London and guaranteed jointly by the Argentine Government, the State Railways, and the Cordoba Central Company. It is reported that the negotiations have progressed so far that the scheme will be submitted to Congress during the present session.

Explosion on the State Railways

On May 20 five tons of blasting powder, loaded on a wagon attached to a train carrying materials for the construction of a new branch of the Patagonian section of the State Railways between Ingeniero Jacobacci (Territory of the Rio Negro) and Esquel (Territory of Chubut), exploded from some unknown cause. The wagon was completely destroyed and the whole train wrecked, five men being killed and seven more or less seriously injured.

Institution of Civil Engineers (Buenos Aires Association)

The inaugural address at the opening of the current session of the association was delivered by the Chairman, Mr. L. A. Woodbridge, M.Inst.C.E. (Chief Engineer, Central Argentine Railway), on "Twenty-five years of engineering progress." The lecturer said that it had occurred to him that on the eve of the Silver Jubilee of their most distinguished member, King George V, a glance over the course of engineering progress during the last 25 years would not be amiss. After outlining the activities of the Institution since 1910, he proceeded to review the progress to be recorded in connection with railways. Among the subjects reviewed were bridge and armoured concrete construction aviation, diesel traction, steam locomotives, electricity, road maintenance, petroleum, and refrigeration, some of the subjects being illustrated by diagrams. At the conclusion, Messrs. M. F. Ryan, J. G. Duncan, W. A. McCallum, and J. R. S. Fox thanked the chairman for his very able and exhaustive lecture.

The following committee has been elected for the current session:—

Chairman, Mr. L. A. Woodbridge; Vice-Chairmen, Messrs. F. L. Creswell, J. H. Taylor, G. H. Austin and H. A. McGillicuddy; members, Messrs. J. G. Duncan, W. G. W. Pound, J. F. Main, P. A. Foy, D. M. Logan, H. R. Pritchard, J. R. Cork, and T. Rodger. Hon. Treasurer, Mr. J. H. Taylor; Hon. Secretaries, Messrs. J. H. Taylor and R. G. Rowbotham.

INDIA

Anxiety over Earnings

The total approximate gross earnings from April 1 to May 10, 1935, amount to Rs. 10.32 crores, representing a drop of Rs. 11 lakhs from the figures for the corresponding period of last year. The tendency of the railway earnings to drop below the level of last year is causing some anxiety to the Railway Board. It is understood that the Board has written to the various railway administrations on the subject, enjoining them to keep a vigilant check upon expenditure so that if the earnings do not come up to the budget estimates, the net result budgeted for may remain unaffected by a corresponding economy in expenditure. The members of the Railway Board will soon be visiting important railway centres on the usual monsoon tour and will personally confer with the agents of various railways on the budgetary position of their respective lines.

Mysore Railway Administration

As already briefly mentioned in these columns, important changes are contemplated in the administration of railways in the Mysore State, a large section of which is at present worked by the Madras and Southern Mahratta Railway under an agreement which terminates on December 31, 1937. It has now been decided that the Railway Department of the Mysore Government will then take over the management of the Bangalore-Harihar and Bangalore-Hindupur sections. The Bangalore-Harihar section has a length of about 210 miles and was completed in 1889. It is part of the metre gauge main line from Bangalore to Poona (for Bombay). The M. & S.M. Railway Company issued £1,200,000 4 per cent. debenture stock for the construction of the Gubbi-Harihar section of the line, and the interest on this loan was guaranteed by the Secretary of State for India on behalf of the Mysore Durbar. The Hindupur line (51 miles) was completed in 1893. The total capital at charge to these railways on March 31, 1933, amounted to Rs. 202 lakhs. In pre-depression years these lines gave an average annual net return of over Rs. 12 lakhs to the Mysore Government after paying the guaranteed interest on the debentures, and the company's share of surplus profits, and even in 1932-33 the income of the Durbar from these railways was some Rs. 7¼ lakhs. The Government of Mysore has arranged to float a new loan, the proceeds of which and the sinking fund in operation will be utilised to liquidate the sterling debenture loan.

Jaipur State Railway

It is understood that the Jaipur State is following a similar course and has given notice to the Bombay, Baroda & Central India Railway of its intention to take over the working of the Jaipur State Railway from April 1, 1936. This is a metre gauge line about 181 miles in length in the Rajputana area. It starts from Sawai Madhopur on the main B.B. & C.I. broad gauge line to Muttra (for Delhi), and cuts across two metre gauge lines of that company, to terminate at Jhunjhunu, its course being roughly from south to north. The total capital outlay on the line up to March 31, 1933, amounted to Rs. 76.6 lakhs and the net earnings of the railway in the year 1932-33 exceeded Rs. 5 lakhs. The railway has been under the management of the B.B. & C.I. Railway for about 30 years.

BRAZIL

Mogyana Railway Annual General Meeting

At the annual meeting of this company, held in São Paulo on May 27, the following financial and statistical results for the year 1934, in comparison with those of the previous year, were announced:—

	1933	1934
	Contos	Contos
Gross receipts	52,000	46,932
Expenditure	34,715	34,086
Net receipts	17,285	12,846
	Per cent.	Per cent.
Operating ratio	66·8	72·6
No. of passengers carried	1,931,980	2,161,687
Tons of parcels and luggage carried	43,632	47,179
Head of livestock carried	207,134	302,774
Tons of coffee carried ...	373,313	310,216
Tons of other goods carried	1,012,094	1,038,525

The principal losses in receipts were in coffee and other goods, amounting to 4,018 contos. The restriction placed upon coffee entries into Santos accounted partly for the falling-off, but intense and unfair road-competition was also experienced, the road services being exempted from the heavy contractual obligations with which railways are burdened, and this resulted in

a serious diversion of traffic. It was confidently hoped that the State Government would take urgent remedial measures to ensure all forms of transport being put on a level footing in this respect.

The Leopoldina Railway
Serious Accident to Passenger Train

On May 23 the day express which leaves Ubá at 7.0 a.m., attaches a portion from Carangola at Recreio, makes connection in Entre Rios with the 5.0 a.m. day express from Ponte Nova, and is due in Barão de Mauá at 9.10 p.m., became derailed between the stations of Recreio and Santa Izabel in the State of Minas Geraes. The train, hauled by a Pacific locomotive and made up to 10 vehicles, was 5 min. late out of Recreio. At the foot of a 1 in 52 down grade on a 106-m. radius curve, as it appears from evidence subsequently collected, a bogie milk van next the tender probably derailed first and caused practically the whole train, including engine and tender to leave the track. The driver, one of the guards and the baggage-man were so severely hurt that they died shortly after the accident, and the fireman, two passengers and the second guard sustained minor injuries.

TANGANYIKA

Finances of Government Railways to March 31

During the first quarter of 1935 receipts on the Tanganyika Government Railways showed a decided upward trend, though the improved position is attributable entirely to increased goods traffic. The following table shows the positions, January-March, 1934 and 1935 :—

	1934	1935	Difference
	£	£	£
Coaching ...	18,932	18,732	— 200
Goods	77,753	94,470	+16,717
Telegraphs, &c.	3,015	2,777	— 238
Steamers ...	1,322	941	— 381
Total ...	101,022	116,920	+ 15,898

Imports and exports increased over both the Central and Tanga lines ; by as much as 33 per cent. and 28 per cent. on the former for imports and exports respectively.

FRANCE

Government Plans Railway Economies

Plans for substantial savings in railway operating expenditure have already been approved by the new French Government, as part of its scheme for balancing the country's budget, and thus contributing to the defence of the franc. It is estimated that the savings will amount to fr. 1,250,000,000 (about £16,600,000 at 75 francs to the £). These economies will be effected mainly by strict application as early as possible of the railway decree of April 19, 1934. This decree provides for the co-ordination of rail and road transport. The Government has already instructed the local authorities to forbid the organisation of any more motor transport concerns in competition with the railways. Furthermore the co-ordination plans will be speeded up. The technical committees to be formed in each department for that purpose, as already stipulated by the supplementary decree of February 25, 1935, are to be completed immediately. The number at present elected and approved is 76, leaving 14 committees to be organised.

Co-ordination Expected Before This Year Ends

All schemes and documents for local co-ordination agreements are to be forwarded to M. Laurant-Eynac, Minister of Public Works, before July 15. The plans will be immediately submitted to the Chambers of Commerce and Agriculture and to the departmental councils, which may be summoned to meet in August in order that the co-ordination plans may become effective before the end of the year.

Problems relative to goods transport by road present the greatest difficulties. Co-ordination proposals to overcome these were submitted to arbitration on May 31 and the decision of the arbitrator was to be given before June 30. The Minister of Public Works will place regulations for the public administration of the co-ordinated system before the Council of State without delay and the regulations are to be adopted before July 14.

Various measures of economy have already been accepted after consultation with the railway authorities. They relate to reforms in fares and goods schedules and to simplified methods of railway operation. In regard to the latter, the co-operation developed between the railways in recent years will be carried to greater perfection. The signalling on lines, where traffic is light will be simplified. Improved shunting methods, standardisation of material and further improvements in locomotives and other tractors will receive close attention.

LATVIA

Present Mileage and Extensions, Including £90,000 Bridge

The latest available figures, from a Department of Overseas Trade report, dated January 19, upon Economic Conditions in Latvia, show that the total mileage of railways in Latvia, including 607 miles of secondary lines, was 1,925 miles, of which total all but 110 miles are State-owned. In addition the following lines are at present under construction: (1) Riga to Rujene (of which the length up to Limbazi has already been opened for passenger and goods traffic); (2) Riga-Ergli-Madona-Karsava (earthwork completed as far as Ergli); and (3) Alsunga to Kuldiga. On the latter construction the bridges have all been built, the formation is complete, and ballasting work also probably by now. The line should be ready for opening shortly.

A bridge is being built over the River Daugava at Krustpils, at an estimated cost of between 1·3 and 1·4 million lats, or say, about £90,000. The piers and abutments are in course of erection, but it is not expected that the bridge as a whole will be completed before the end of the year.

Train Services

International passenger train services in and out of Riga are to be considerably improved during the current year. All services to Berlin and Warsaw will be augmented and the time taken between Riga and Tallin will be reduced by about four hours. Some of the narrow gauge lines are to be equipped with railcars and the present intention is to go further and instal streamlined express railcars or motor trains on some of the longer distance runs and international routes.

SOUTH AFRICA

Financial Position at Close of Financial Year 1934–35.

The final figures for the financial year ended March 31, 1935, are now available. After writing out of capital account the value of harbours dead assets (£679,644) and making special contributions of £100,000 to rolling stock depreciation and £837,000 to betterment, pension and superannuation funds, there remains a surplus of £2,547,701. The accumulated deficit of £2,168,269 brought forward from the previous year has been overtaken and a surplus of £379,432 carried forward. The earnings from railway transportation services only for the year totalled £27,021,814, an increase of £3,314,290 over the previous year. Railway working expenditure totalled £18,341,222, an increase of £1,421,702.

Further Train Service Accelerations

In addition to the accelerations referred to in THE RAILWAY GAZETTE of April 12 last, the following train service improvements have taken place :—

Main Line Services	Trains per week	Minutes saved per train
Capetown-Johannesburg	3	30
Capetown-Johannesburg	1	22
Capetown-Bulawayo ...	1	30
Port Elizabeth-Johannesburg	4	30
Port Elizabeth-East London	6	46
East London-Port Elizabeth	6	90
East London-Johannesburg	5	20
Welverdiend-Johannesburg	1	48
Welverdiend - Johannesburg	5	28
Reef Suburban Services		
Springs-Johannesburg ...	69	5½
Johannesburg-Springs ...	68	5
Johannesburg-Randfontein	24	3
Randfontein - Johannesburg	42	7½

OUR CENTENARY—MESSAGES FROM READERS

As announced in our May 3 issue, "The Railway Gazette" and the journals incorporated with it have completed 100 years of continuous publication

THE following is the ninth instalment of the many messages we have received in connection with the centenary of THE RAILWAY GAZETTE and the various railway journals now incorporated with it, the earliest of which made its first appearance on May 1, 1835. In expressing our thanks to all who have written, may we say how greatly we value their appreciative and encouraging messages.

Mr. C. A. Murton, Secretary, Queensland Government Railways, Brisbane

May I take this opportunity of wishing THE RAILWAY GAZETTE many happy returns of its centenary. At the same time, my Commissioner wishes to congratulate those responsible for its publication upon the high standard attained and to say that he considers the journal to be most valuable in enabling constant touch to be maintained by railway administrators with advancing practice and with the treatment of current problems.

Mr. A. C. Fewtrell, Chief Civil Engineer, Department of Railways, New South Wales

I desire to offer you my sincere congratulations on THE RAILWAY GAZETTE having reached its centenary. I have also to add that the features which are most interesting and useful are the illustrations and descriptions of civil engineering works, together with articles on the maintenance of railway tracks.

Mr. D. A. Hendrie, Late Chief Mechanical Engineer, South African Railways and Harbours

As a subscriber for over 20 years of THE RAILWAY GAZETTE it gives me very great pleasure indeed to offer you my heartiest congratulations on the attainment of the 100th Anniversary of THE RAILWAY GAZETTE, an achievement, I should say, unique in the annals of engineering history. Although living a retired life since 1923, I am still deeply interested in all matters concerning locomotive developments, as well as electric and road traction and, I can assure you, that had it not been for the able articles and illustrations appearing in your paper from week to week, my interests certainly would have been on the wane long ago.

Mr. G. H. Mackley, General Manager, New Zealand Government Railways, Wellington

The brief editorials give a vivid summary of the principal railway news of the week, and are so prepared that their content may be understood at a glance, while any matters of major importance are usually supported by special articles in the same issue. The "Overseas Railways Affairs" pages from your official correspondents serve an invaluable purpose for comparison of progress and improvements in other countries in relation to developments in which this country is likely to be interested. The review of the principal new railway publications is a valuable guide to our librarian in maintaining modern supplies of current railway literature. The bright stories, with a *Punch*-like flavour, in "The Scrap Heap" lend a page of diverting relief to the tone of the journal, and at the same time contain some valuable lessons. The technical articles are especially interesting to the heads of the various branches of the department particularly concerned. A notable feature of the journal is the high quality of reproduction in plans and half-tone photographs. These invariably show an exceptionally good standard of draftsmanship and reproduction skill. The personal notes have an unfailing interest for all officers. An important feature of definite use to the Department is the section of impressive advertisements of services and supplies. Altogether, THE RAILWAY GAZETTE, in having reached a hundred years of publication, shows that it has throughout that long period of changing transport conditions met a very real need, and its recent enlargement to include new engineering features is a clear proof that its usefulness was never more assured than at present.

Mr. G. V. O. Bulkeley, C.B.E., General Manager, Nigerian Railway

May I convey the cordial congratulations of the Nigerian Railway on the centenary of THE RAILWAY GAZETTE. The enterprise with which it has encouraged and chronicled research, the authoritative nature of its articles, the outstanding excellence of its illustrations and drawings, and the genial yet penetrating tone of its editorials—all are beyond praise.

I myself may claim to have been brought up on the vitalizing and sustaining railway diet presented weekly by THE RAILWAY GAZETTE. I have also had the privilege of contributing on occasion to the ingredients. For the officers of a colonial railway, I regard the study of contemporary railway literature as all-important. Towards this end, the Nigerian Railway distributes copies of THE RAILWAY GAZETTE to its District Officers.

Mr. H. W. Wyles, Signal and Electrical Engineer, New Zealand Government Railways, Wellington

I congratulate THE RAILWAY GAZETTE on having completed one hundred years of continuous publication. I have been a reader of your paper for over 30 years and the technical value of its articles has been considerable. To those of us who were trained in England and are now living in other parts of the world, the general notes on railway matters and personnel are always of great interest. From my point of view, possibly the most interesting features of the paper are those dealing with operating developments in the field of signalling and communications.

Mr. W. C. Sanders, General Manager, Railway Division, The Timken Roller Bearing Company, Canton, Ohio

May I congratulate you on your 100th birthday. Having been a subscriber to THE RAILWAY GAZETTE for a number of years, I look forward to receiving it each week. For real railway news of the entire world, your magazine is outstanding, and I am always particularly interested in your column, "Overseas Railway Affairs." The photographs which you reproduce showing locomotives, rolling stock, stations, and new construction are so clear and complete that we clip a number of them and keep them in our permanent files to cover the progress being made in the world-wide railway construction. We wish you as much success for the next 100 years as you have had during the past.

Sr. Frederico Reparaz, Secretary of the Council of Administration, Northern Railway of Spain, Madrid

It is with great pleasure that we offer you our very warm congratulations on the centenary of your publication, on the success which is proved by such a life, and also for the able way in which your journal is conducted. Each successive number is truly more interesting than the previous one and the volumes of your journal constitute a true history of the railways. It is very difficult for us to inform you what part or matter in THE RAILWAY GAZETTE has the greatest interest or attraction for us. The whole journal is equally attractive but we should not fail to mention the interest which your *Diesel Railway Traction Supplements* have for us. The diesel engine and electrical haulage are specially interesting for our country. Trusting that your journal will have a life as long and prosperous as it deserves.

XUM

IMPRESSIONS OF OVERSEAS TRANSPORT

XXII—The Australian Commonwealth Railways

By A. W. ARTHURTON, formerly Secretary, British Railways Press Bureau

NO impression of Australian railways would be complete without some description of the Commonwealth system, which is owned and controlled by the Commonwealth Government. It is important as providing a service through territories which the individual States could hardly be expected to furnish as, in view of the sparsely inhabited districts served, there is usually little prospect of earnings equalling working expenses. The Commonwealth Railways consist of four separate undertakings aggregating 2,145 miles in length. The Central Australia Railway, which is 771 miles in length, runs from Port Augusta to Alice Springs in the centre of the continent, from which connection across the desert to the railhead of the North Australia Railway, about 1,000 miles, has to be made by camel or motorcar. The North Australia Railway runs from Darwin on the north coast to Birdum (316 miles), and an extension is projected to Daly Waters, some miles further into the desert. Both these lines are 3 ft. 6 in. gauge. The Federal Territory Railway is a short line, under 5 miles in length, forming a connection between the New South Wales Government Railways at Queanbeyan and Canberra, the Federal capital.

The most important of the Commonwealth Railways is the Trans-Australian Railway, which connects Port Augusta and Kalgoorlie, and is the only land link between the western and the more populous eastern states, saving several days in the journey from one to the other. It is over 1,000 miles in length and traverses the great Nullarbor Plain, or desert. The whole of the route is practically waterless and not a single permanent stream of water is crossed. Water storage for railway purposes for about 300 miles at each end of the line has been provided and water trains, consisting of huge iron tanks, are a prominent feature of the traffic. Another water difficulty is due to the scale-forming solids it contains. Barium water treatment plants have been installed in recent years and three of these plants are now in operation. These have been uniformly successful, and the elimination of the harmful solids from the water is reflected in the absence of tube troubles and the better condition of the boilers, leading to reduced maintenance costs and improvement in running. Approximately 17,500,000 gallons of water were treated last year and resulted in the removal of 42 tons of scale-forming salts and 38 tons of corrosive salts.

The line is standard gauge (4 ft. 8½ in.), but much of its usefulness as part of the trans-continental through route is nullified by the necessity of changing gauge at Port Augusta and Terowie. The earnings of the Trans-Australian Railway, which decreased considerably in the years following 1929, have shown an improvement during the last two years. Last year, for example, the number of sheep carried increased by 30 per cent., and cattle are now being conveyed by rail from Alice Springs in Central Australia to Kalgoorlie, a distance of 1,823 miles. Formerly these cattle were driven across the continent to Kalgoorlie and the ports in great droves, the journey occupying some months.

When I called upon Mr. Gahan, the Commonwealth Railways Commissioner in Melbourne, he strongly recommended me to take a trip on the Trans-Australian Railway, and, although this meant three days and three nights in the train from Adelaide to Perth (1,600 miles), I felt it was an experience which should not be missed. Leaving Adelaide, therefore, at 10.5 on a Friday morning in a train made up of compartment coaches similar to those in England, we reached Terowie, 140 miles distant, at three o'clock in the afternoon and changed to the 3 ft. 6 in. gauge. It is this section of 3 ft. 6 in. line from Terowie to Port Augusta which is the bugbear of the trans-continental journey and exasperates the traveller. The route via Red Hill and the proposed standard gauge line thence is designed to obviate its inconveniences. A hundred miles further on we reached Quorn, the junction with the Central Australia Railway. At Port Augusta, which was reached at 10.0 p.m., we transferred to the Trans-Australian train, composed of some fine rolling stock, which made a favourable impression on us after the somewhat cramped accommodation on the 3 ft. 6 in. gauge.

The fares include reserved seats, sleeping berths and meals on the Trans-Australian and Kalgoorlie-Perth lines. The sleeping berths, furnished with upper and lower berths, wash-basin and two hanging cupboards for clothes, looked very comfortable, and shower baths for the "morning tub" promised some mitigation of the intense heat of this arid plain. Tossing up with my sleeping partner, a young doctor from Perth, for choice of berths, we entered upon the first stage of our journey across the Nullarbor Plain, which is unique in many respects. For two nights and two days the train steamed through the great treeless waste, which stretches practically from Port Augusta to Kalgoorlie. The plain is not a dead level, but rolls away mile after mile in gentle undulations, and the railway for 328 miles is dead straight. Looking back, the shining rails run on towards infinity, until they seem to meet in the dim distance. Looking forward, the same twin threads are drawn out until they melt into one another. Elsewhere there is nothing but the plain and the sky. The lounge cars on the train were equipped with writing and card tables, newspapers and magazines, and even a piano was supplied, which was found very useful before the journey ended.

Throughout the long hot days nothing was to be seen but dwarf bluebush and saltbush, best of all native fodder plants in these regions. The leaves of these plants, unlike all other vegetation, can absorb moisture from every rare shower of rain, and drink in the dew that often falls heavily in these parts. There is no grass, but sheep can exist entirely and well on saltbush. For hundreds of miles not a tree is to be seen and even the ubiquitous gumtree is absent. Beneath the limestone plain are multitudes of caverns and subterranean passages in which strange creatures abound. A barking lizard, or mountain devil, was brought to the train by one of the aborigines.

The Australian natives, or blackfellows, and their *gins* are apparently a low type of humanity. They brought sticks, clubs and boomerangs to the train for sale and were willing to show their skill with these primitive weapons. All looked as if a good wash and a good meal would be beneficial. The older men have long bushy beards and the *gins* usually have a baby slung at their backs. All were dressed in tattered, nondescript clothing, apparently given them by white people. The stations or wayside stopping places along the railway consisted solely of a few wooden huts, with the inevitable tin roofs, where the station and permanent way staffs lived, and were named after former Prime Ministers of Australia, such as Deakin, Hughes, Reid and Forrest. Others bore native names.

XUM

AIR CONDITIONING OF TRAINS—IV

Conditioning versus Pollution

By STUART MIALL, B.Sc.

TO condition the air in a railway carriage means primarily to send air in at a higher or lower temperature than that at which it can be obtained outside. It involves filtration and the control of moisture content as well, but no particular difficulties are associated with these once the problem of temperature regulation has been satisfactorily overcome. Except in electric trains the energy needed to modify the temperature of the air admitted to the carriages must generally come from a self-contained locomotive. For heating the air steam must be drawn from the boiler, and for cooling the air mechanical power, ultimately traceable to the locomotive, must be expended in operating a refrigerating machine. Obviously there will be a limit to the demands which can be made on the locomotive in this way, and in America, where air-conditioning has made great progress, the air sent into the carriages is only about 25 per cent. fresh air, the remainder being air which has travelled through the carriage before but not yet lost the warmth or the coolness it was given before it first came in.

Occasionally a separate boiler is provided for train heating, and not uncommonly the cooling is accomplished by carrying ice instead of taxing the power of the locomotive. But even so there is the need for economy, and only a limited amount of fresh air can be included in the streams delivered through the grilles in the carriages. Generally speaking 75 per cent. of the entering air will have to be recirculated air if the velocity of circulation through the carriage is to be adequate, and if at the same time the temperature regulation is to be reliable without necessitating a heavy expenditure of steam, ice, or locomotive power.

The possibility of recirculating air is present because in general the air removed from the carriage will be but little changed by its passage through the carriage. It will contain a smaller percentage of oxygen, and a larger percentage of carbon dioxide, but usually it will be quite fit for further use if its temperature is again adjusted by heating or cooling, and if its surplus moisture is extracted, or excessive dryness moistened. If passengers exhaled poisonous vapours, or if their indulgences involved the production of disagreeable odours, the proportion of used air which might be introduced would be strictly limited.

Noxious constituents in the air are bearable and even unnoticeable if sufficiently diluted, but recirculation involves a cumulative increase in the impurity content of the air in a carriage, so that it is the degree of concentration which the given impurities may be allowed to reach which must determine the extent to which recirculation is possible in actual practice. Some impurities are not to be taken into account in this respect, because they are to be readily removed by filtering or washing the air containing them, but in certain circumstances there may be others which no simple treatment of the air will remove.

The English passenger differs from the American passenger in wanting to smoke wherever he is, and this is likely to affect the prospects of air-conditioning in this country, because any difficulty in absorbing the odoriferous products of pipe, cigar, and cigarette by washing or screening will prejudice the case for recirculation, and hence for any treatment of the air which involves the expenditure upon it of considerable amounts of energy. After all, it would be just as foolish to condition the air in these circumstances as it would be to provide carpets in compartments where passengers habitually spat, or to provide bathrooms for people whose only idea about baths was that they were useful to keep coal in.

Quantitative Considerations

As is well known, only a very small quantity of matter need be added to the air in a room to make it smell bad, and we do not have to consider additions such as would appreciably affect the density of the air or add to the weight handled by the fans. As a drop of ink vitiates quite visibly a whole tumblerful of water without changing appreciably its weight or density, so the merest trace of certain substances in the air will make it wholly obnoxious to human beings.

Suppose that the traces of harmful matter are added at a rate which would render unpleasant to a given degree n lb. of air a minute. If the total amount which has been added up to any instant is sufficient to pollute N lb. of air to the given degree, while the carriage holds *in toto* M lb., the percentage pollution in that carriage at the given instant will be $N/M \times 100$ after the foul and the pure air have been thoroughly stirred together. The fraction N/M may be called the "degree of pollution." It will reach unity if all M lb. of air should become polluted to the preconceived limit. It will exceed unity if the process of pollution is allowed to go on. This is because each lb. of air, polluted to the limit once by the addition of a certain trace of harmful matter, and then polluted further by the addition of a second and equal trace, will count as two lb. from the point of view of its vitiating effect on the whole body of air in the carriage.

Any weight of air multiplied by its degree of pollution may be called "quantity of pollution" for this product will be a measure of the very small weight of the harmful material in the given weight of air. If w lb. of vitiated

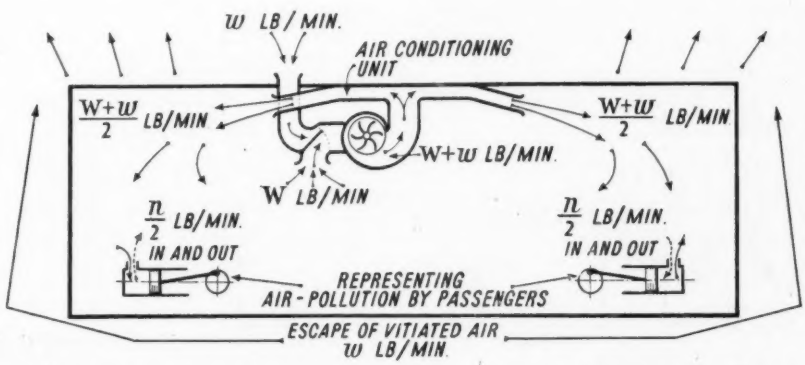


Fig. 1—Diagrammatic representation of an air circuit in air-conditioned car

air leave a carriage in every minute, then the rate of loss of pollution will be w N/M quantity units a minute. In general w lb. of fresh air will be admitted in each minute to replace the polluted air which escapes, and the fan will handle a total of C = W + w lb. of air a minute, W being the weight of recirculated air handled in this time. Fig. 1 shows the significance of the various quantities mentioned here.

Formulæ for the Increase of Air Pollution with Time

At a given instant the quantity of pollution in a carriage is N quantity units, this being the weight of air which could be polluted to the standard degree by the harmful matter present. N may be less than M (N/M < 1), equal to M (N/M = 1) or greater than M (N/M > 1). Pollution being added at the rate of n quantity units a minute (see Fig. 1) and being lost at the rate of Nw/M units a minute, we have

$$\frac{dN}{dt} = n - \frac{N}{M}w = \frac{nM - Nw}{M}$$

Separating the variables we have

$$\frac{dN}{nM - Nw} = \frac{dt}{M}$$

By integration

$$-\frac{1}{w}\log_e (nM - Mw) = \frac{t}{M} + A$$

where A is the constant of integration.

We will assume that vitiation of the air commences after the circulating fan has been started, and that time is measured from the instant when this vitiation begins. Under this assumption N = O when t = O. Hence

$$-\frac{1}{w}\log_e nM = A$$

and the equation applicable to our case is

$$-\frac{1}{w}\log_e (nM - Nw) = \frac{t}{M} - \frac{1}{w}\log_e nM$$

whence

$$\frac{1}{w}\log_e\left(\frac{nM - Nw}{nM}\right) = -\frac{t}{M}$$

$$\frac{nM - Nw}{nM} = e^{-\frac{wt}{M}}$$

$$\frac{Nw}{nM} = 1 - e^{-\frac{wt}{M}}$$

$$\frac{N}{M} = \frac{n}{w}\left(1 - e^{-\frac{wt}{M}}\right)$$

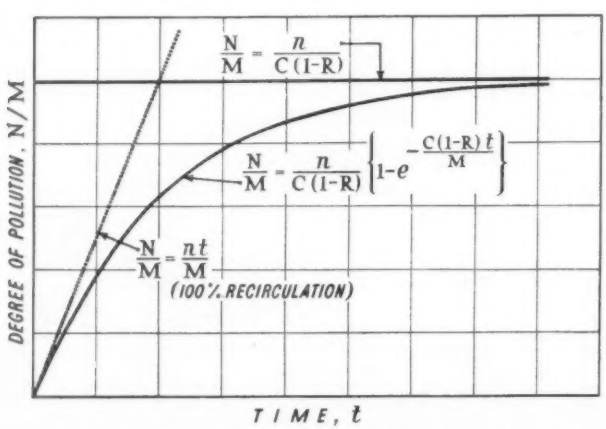


Fig. 2—Cumulative pollution of air in carriage

Now the ratio W/(W + w) may be called the " recirculation factor " and be denoted by R. Then we have

$$1 - R = 1 - \frac{W}{W + w} = \frac{w}{W + w} = \frac{w}{C}$$

so that w = C (1 − R).

Putting this in the equation for N/M we have:—

$$\frac{N}{M} = \frac{n}{C(1 - R)}\left\{1 - e^{-\frac{C(1-R)t}{M}}\right\}$$

This expression shows that the degree of pollution increases like the temperature of an electric motor with constant losses—it tends to some limit which it almost reaches in a comparatively short while, as shown in Fig. 2, but which it never reaches absolutely. In our case the limit is n/C (1−R). For a given n and C, the limit will depend on (1−R) being for example four times as high when the recirculation factor R = 0·75 as it is when R = O.

Air-conditioning systems dispensing with recirculation (R = O) will give a lower pollution limit if the capacity C_1 of the fan used exceeds the product C (1−R) for the systems employing recirculation. Where R = 0·75, equal pollution limits will correspond to $C_1 = \frac{1}{4}C$.

The Pollution Effect in Carriages for Short Time Occupation

In a car which is occupied for long periods, the limit n/C (1−R) is for all practical purposes reached and R must be adjusted to keep it below the figure where it first corresponds to a nuisance. A car which is occupied for a short while might however have R adjusted to give a higher limiting degree of pollution, as the passengers will have left before the worst happens. For such a car it is useful to know the value which must be given to R so that N/M just reaches the nuisance point P in the time t = T available. We have

$$\frac{N}{M} = P = \frac{n}{C(1 - R)}\left\{1 - e^{-\frac{C(1-R)T}{M}}\right\} \ldots \quad (a)$$

This unfortunately cannot be solved for R, but if R be given various values it can be solved for T and a graph can be plotted from which the value of R for any given T can be taken. Equation (*a*) can be written

$$e^{-\frac{C(1-R)T}{M}} = 1 - \frac{PC(1 - R)}{n}$$

whence

$$-\frac{C(1 - R)T}{M} = \log_e\left\{1 - \frac{PC(1 - R)}{n}\right\}$$

and

$$T = -\frac{M}{C(1 - R)}\log_e\left\{1 - \frac{PC(1 - R)}{n}\right\}$$

$$= -\frac{2{\cdot}303\,M}{C(1 - R)}\log_{10}\left\{1 - \frac{PC(1 - R)}{n}\right\} \quad (b)$$

This is the equation to be used in constructing the graph.

Equations (*a*) *and* (*b*) are useful in cases where R < 1, but if R = 1 they give indeterminate results. This particular case may however be investigated separately and it does not need much penetration to see that when R = 1

So that

$$t = \frac{N}{n}$$

$$\frac{t}{M} = \frac{N}{nM}$$

and

$$\frac{N}{M} = \frac{nt}{M}$$

Here we see that $\frac{N}{M}$ grows with time according to a simple linear law and tends to no limit as when there

is replacement of vitiated air by fresh air. For the time T needed by N/M to reach a particular figure P we have

$$T = \frac{MP}{n}$$

The Measurement of the Quantities Involved

For a given carriage, M and C will be known but the degree of pollution permissible with a given substance will have to be ascertained by the simple experiment of adding the substance to air until it first begins to give offence. This degree which is P can be denoted arbitrarily as unity. The amount of air which could be brought in every minute to this unit degree of pollution by the action of passengers or in other ways will have to be estimated next, and this is the figure n in the above calculations.

Research is needed to discover what particular impurities will have to be guarded against in this and other countries, and to find out the permissible degree of pollution with each. Having information on these two points an investigator could easily explore all the various possibilities by using the several mathematical relationships given in this article.

RAILWAY MAINTENANCE PROBLEMS, VII.—ANCILLARY WORKS

By Lt.-Col. H. A. HULL, M.Inst.C.E., District Engineer, Northampton, L.N.W.R., and L.M.S.R., 1918-33

Notwithstanding all the knowledge now available in print some of the most essential and elementary facts are often ignored. There are always pioneers at work, on whose heels follow those with ingenious minds to record their results as formulæ for the future guidance of the unimaginative or timid.

TO run a district efficiently it must, as far as possible, be self-contained, for, apart from the general routine of ordinary maintenance, for which a programme can be drawn up and largely adhered to, the risk of minor or major mishaps must be reckoned with, and, unless appliances and man power necessary to cope with the emergency are readily available, unnecessary delay to traffic may ensue. It is therefore desirable that a central depot for the district should be available, not only to deal with ordinary maintenance requirements, but to provide a convenient place to store emergency plant which may be rushed to the site of any mishap with a minimum of delay.

A supply of emergency timbers of suitable lengths and sections is one of the most important items, and the writer was occasionally even able to assist adjoining districts by the loan of his stock. An emergency store was also set up to be opened only in cases of emergency. It was normally kept locked with the key behind a glass panel which could be broken when the need arose. This store contained a supply of small plant ready to be loaded up at a moment's notice, such as picks, shovels, barrows, crowbars, hammers, saws, buckets, ropes, nails, flare lamps and oil, the whole being periodically overhauled so that it should be always in perfect order for immediate use.

A great asset to a district is a sand and gravel pit, in

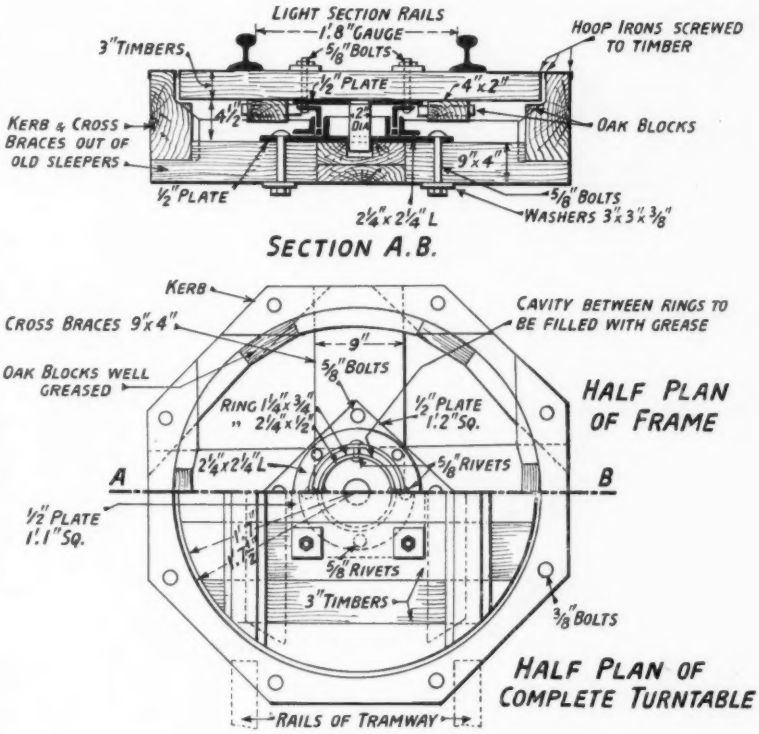


Fig. 1—Tramway turntable

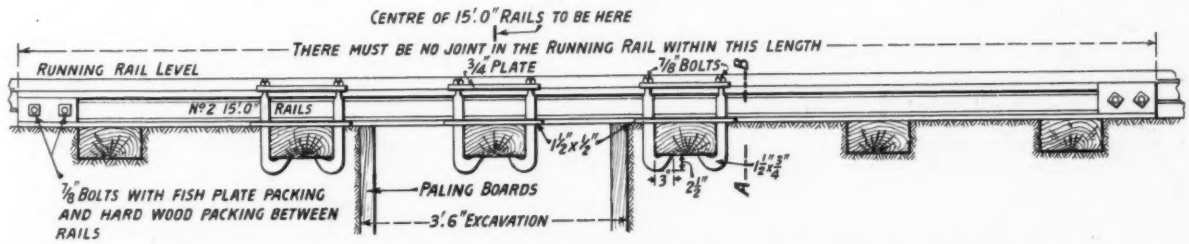

CENTRE OF 15'.0" RAILS TO BE HERE
THERE MUST BE NO JOINT IN THE RUNNING RAIL WITHIN THIS LENGTH
RUNNING RAIL LEVEL
3/4" PLATE
7/8" BOLTS
B
No 2 15'.0" RAILS
1/2" x 1/2"
1 1/2" x 3/4"
A
1/8" BOLTS WITH FISH PLATE PACKING AND HARD WOOD PACKING BETWEEN RAILS
PALING BOARDS
3'.6" EXCAVATION

Fig. 2A—Method of temporarily supporting track (details are shown in Fig. 2B)

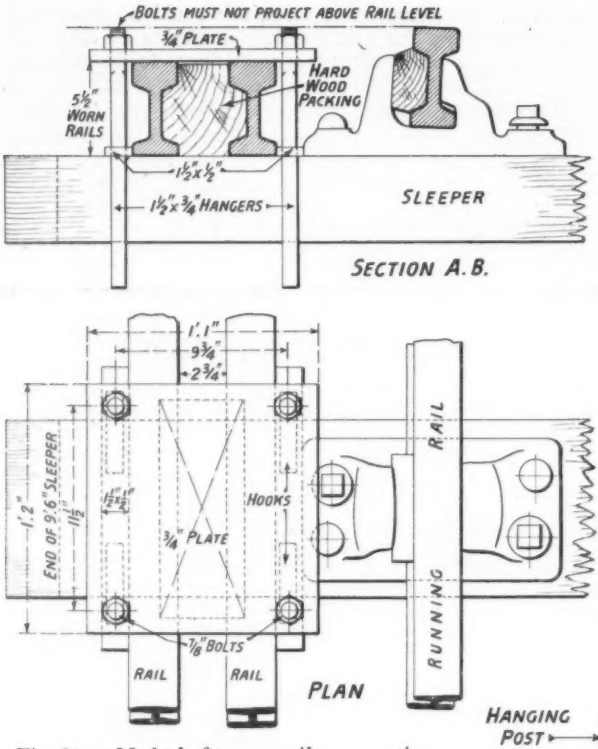


Fig. 2B.—Method of temporarily supporting track (See Fig 2A)

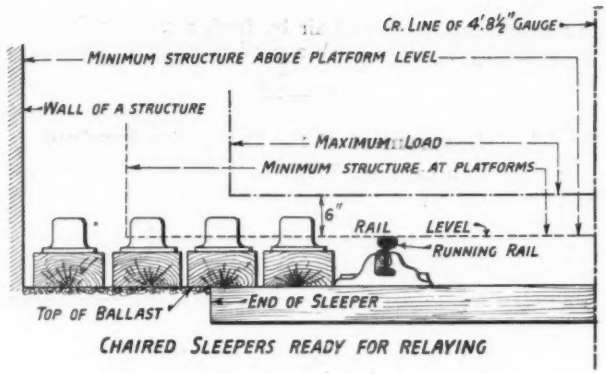


Fig. 3.—Chaired sleepers encroaching on structure gauge

the possession of which on his district the writer was fortunate. The site of the excavated material was used for the storage of spent locomotive ashes from engine sheds, a handy supply of which material is useful for emergency purposes. Spent ballast was also stored at this site to be used for dock metalling, as mentioned in a previous article. Bricks taken out of structures during the course of repairs were also sent to the site to be broken up for concrete. The over-bearing above the sand was used for dealing with slips in the manner described in the first article of this series.

The excavated site of a sand and gravel pit can also be used for spoil, but in the writer's experience very little spoil accumulated since most of the so-called waste materials were found capable of re-use in some form or another, there remaining only the inflammable rubbish of station refuse and yards, which so far as possible was burned. The writer never quite solved the problem of preventing the station staffs from using the permanent way as the most convenient receptacle for sweepings from platforms.

As the sand pit for the district had also to supply neighbouring districts not so well equipped, as well as sand for locomotive running sheds, there was usually full employment for a gang of men. Originally the sand was shifted over barrow runs, but the writer replaced these with 1 ft. 8 in. gauge track equipped with side and end tip wagons pushed by hand. These contained about three times the quantity formerly carried by the hand barrows. The track was portable so that it could be readily moved as required. It could also be taken out on the district at any time in connection with earthworks or extensive slips. Fig. 1 gives details of the turntables used. They were constructed at the district depot at very little cost, and, although they have been used continuously for 16 years and subjected to rough usage, they

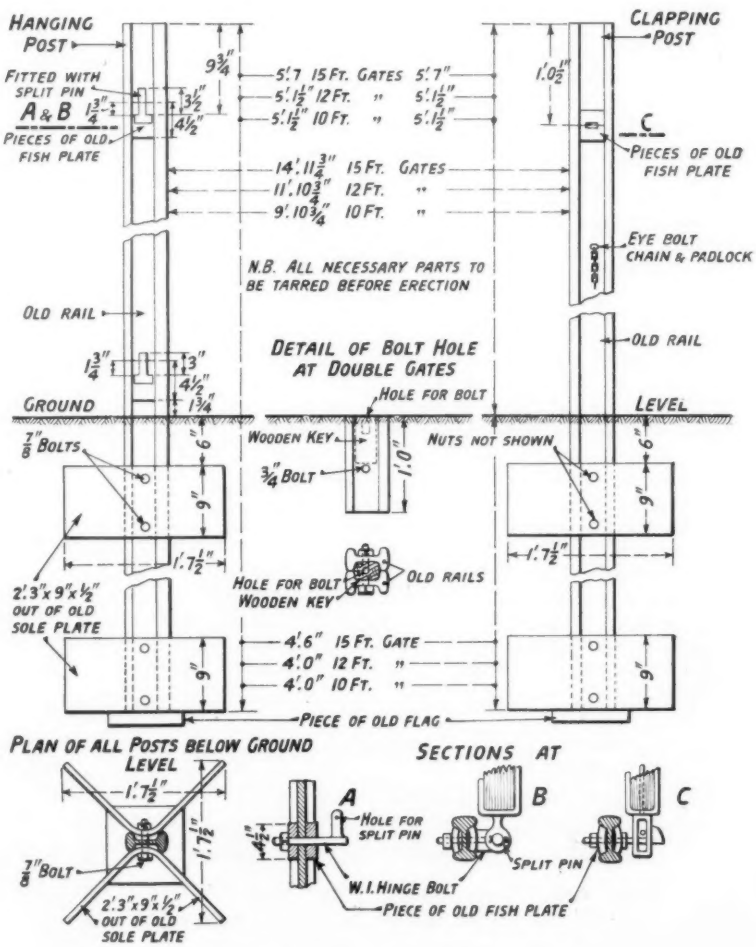


Fig. 4.—Gate posts for occupation crossing

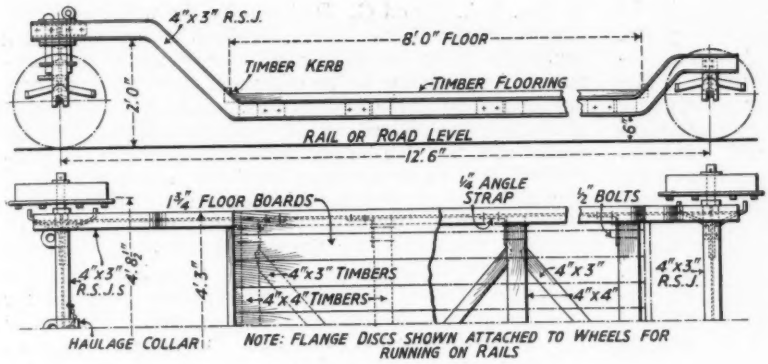


Fig. 5A

Left: Fig. 5A. Elevation and half plan of road-rail trolley

Below: Fig. 5B—Half front and back elevators and detail of road-rail trolley

Bottom: Fig. 5C—Road and rail trolley: half elevation on rail, ditto on road, and sectional elevations on road and rail

have required no maintenance beyond occasional greasing.

For supporting the running road when any disturbance of the roadbed was necessary the writer used sets of carriers, as shown in Figs. 2 A and B, which were normally kept at the central depot. By the use of these it was unnecessary to disturb the ballast under the sleepers except to the very small extent required to get in the hook end of the bolts. It will be noticed that the tops of the bolts are not above rail level so as not to trespass upon the space between the minimum structure gauge and the underside of the maximum load. This is an important point not infrequently forgotten both by permanent way men and as well as men of other departments. Occasionally chaired sleepers for relaying or repairs are laid on the ends of the sleepers, as shown in Fig. 3, which involves trespassing on the structure gauge to the extent of several inches by the sleepers nearest to the track, as indicated in the figure. An instance of the risks of this practice was provided on one occasion when a passing well-wagon, which was subsequently found to be low on its springs and therefore slightly out of gauge, caught one of these chaired sleepers and sent it and its neighbours flying—fortunately with no more serious results in this particular case than the smashing of the sleepers and chairs.

Apart from public road crossings there were over 300 occupation level crossings on the writer's district, each

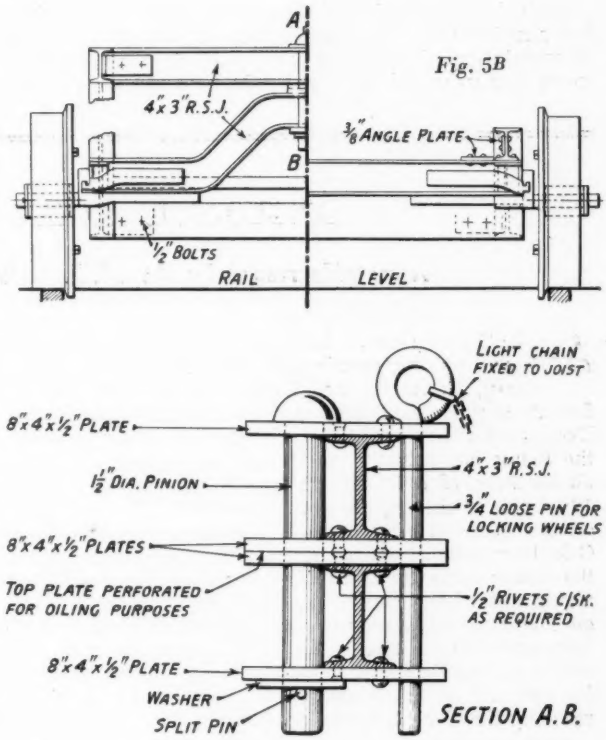


Fig. 5B

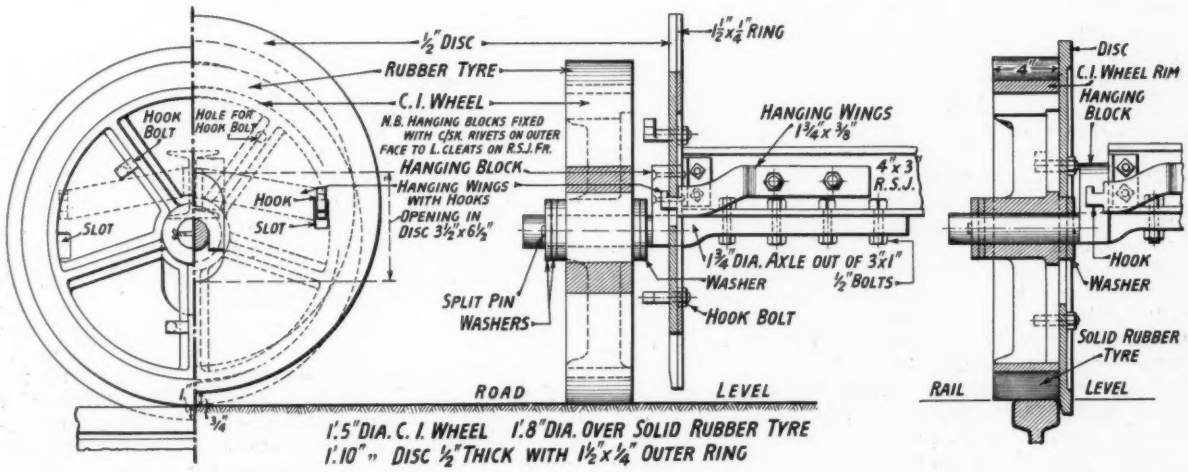


Fig. 5C

provided with a pair of gates hung on oak posts. As the average life of such posts does not exceed 40 years, owing to rotting at ground level, the annual renewal expenditure on this item alone was considerable. Reinforced concrete posts were not altogether satisfactory as a substitute, being clumsy and heavy to handle, as well as liable to fracture in transport and handling. Further, they were found difficult to keep vertical after they had been fixed. The writer therefore designed gate posts made out of old rails and soleplates, as shown in Fig. 4. These were cheap to manufacture, being mostly made out of scrap materials obtainable in the district. They were easy to make, to handle and to fix, and remained plumb. They are practically unbreakable and last almost indefinitely with only an occasional coating of tar.

With the introduction of spraying equipment for painting structures on the district the problem of the easy transportation of the plant from one bridge or structure to another arose and was met by the type of trolley shown in Figs. 5 A, B and C. Designed by the writer and constructed at the district depot, its chief feature was that it could run either on road or rail as required. The transference from the one to the other was made at the numerous occupation level crossings on the district, the operation of removing the detachable flanges being a simple one. By means of a portable timber ramp (not shown in the illustration) the paint spraying machine, which was itself mounted on small wheels, could be run on or off the trolley at the site of the structure to be painted and left there, so releasing the trolley for the time being. The ordinary length gang of three men, on a branch line, with the assistance of two painter's labourers were sufficient for the handling of the trolley and the plant. The trolley was worked along the line under the same rules as an ordinary platelayer's trolley.

(*We hope to publish the next article in this series in our issue dated August 2. Previous articles appeared in our January* 18, *February* 15, *March* 15, *April* 12, *May* 10, *and June* 7 *issues.*)

ANGLO-NORWEGIAN STEAMER SERVICES

A notable record by the M.V. "Venus" between Newcastle and Bergen

A FINE performance has been put up by the m.v. *Venus* on the crossing between Tyne Commission Quay, Newcastle, and Bergen (Norway) during the first three years that this vessel has been in commission. Designed for a normal speed of 19 knots in fair weather, the *Venus* has actually maintained an average speed, in all weathers, of 18·9 knots in the first year of her service, 19·0 knots in the second, and 19·3 knots in the third, and on one occasion only has the boat train connection for Oslo been missed on the Norwegian side. Every week the *Venus* is in the North Sea for four days and four nights out of the seven. Leaving the Tyne at 8 p.m. on Tuesdays and Saturdays, in connection with the 1.20 p.m. express from King's Cross, the ship is due in Bergen at 5 p.m. on Wednesdays and Sundays, and leaves again for England at 11.30 a.m. on Thursdays and Mondays, reaching the Tyne Commission Quay at 8.30 a.m. the following morning. The normal turn-round time on the Norwegian side is thus 18½ hr., and on the English side it is 11½ hr. on Tuesdays, and 35½ hr. on Fridays and Saturdays, so that the time available for examination of machinery and routine adjustments is very limited. Oil is taken on once weekly. From port to port the distance covered is 404 miles, so that a total of 1,616 miles a week at sea is involved. Overhaul is conducted in the spring, but from two to three weeks usually suffices. The vessel is driven by two Burmeister & Wain four-stroke single-acting engines, designed to develop 5,000 h.p. each in ten cylinders of 630 mm. dia. and 1,100 mm. piston-stroke, at a speed of about 155 r.p.m. The cylinders are pressure-charged by vane-type chain-driven blowers at the back of each engine, and the mean indicated pressure in each cylinder varies from 8·5 to 9 kg. per cm., corresponding to between 122 and 130 lb. per sq. in. Few marine diesel motors operate continuously with so high a mean effective pressure as this. Fuel consumption averages about 0·38 lb. per b.h.p. hour, and the total indicated h.p. of the two engines during the crossing averages 11,600, which is in close correspondence to the designed output of 10,000 b.h.p. Normally, therefore, the ship is being worked to full capacity on all voyages, as the engines are very seldom slowed down, and considering the unpleasant habits of the North Sea, the record of consistent and punctual service which has been maintained in such conditions has been most praiseworthy. During the first two months of 1934, a "full storm" was recorded on 16 out of 19 consecutive trips made by the *Venus*, and a singular happening of this period was that on five successive voyages the *Venus* passed a ship that was also bound from Newcastle to Bergen, but unable to make progress owing to the severe north-easterly conditions.

The *Venus*, with her length of 412 ft. overall, and gross tonnage of 5,600, is the largest ship regularly engaged in the North Sea traffic, and was, until the recent introduction of the Belgian National Railways' *Prince Baudouin* on the Dover-Ostend service, the fastest motorship afloat. She has accommodation for 185 first-class and 78 second-class passengers, and during last summer proved so deservedly popular that for many consecutive weeks during the height of the season practically every berth was engaged. As previously mentioned, the connecting service, with through coaches between King's Cross and Tyne Commission Quay on sailing days, leaves London at 1.20 p.m. On arrival of the steamer at Bergen, through coaches for Oslo, with first, second, and third-class sleeping cars, are waiting on the Quay, and are worked through a tunnel into the railway station in readiness for the departure of the 8 p.m. train, which reaches Oslo (Ostbanen) at 7.5 a.m., 41¾ hr. after leaving London. In view of the extremely spectacular character of the railway route, however, which reaches an altitude of over 4,000 ft. near Finse, many passengers prefer to sleep in Bergen, and to proceed with the 8 a.m. train on the following morning, in the formation of which comfortable tourist observation coaches and a restaurant car are included. The rail journey is one of 305 miles, and Oslo is reached at 8.10 p.m. Steamers for all the Norwegian coastal ports also run from Bergen in connection with the arrival of the *Venus* from Newcastle.

RAILWAYS AND ROAD TRANSPORT SECTION

This section appears at four-weekly intervals

The Road Train

WHEN referring at some length in THE RAILWAY GAZETTE of May 10 to the successful trials of a road train in Australia it was stated that two similar outfits had been ordered by the Russian Government. They have now been delivered and one of them is shown in the photograph we reproduce below. It may be recalled that the scheme is one evolved by the Oversea Mechanical Transport Directing Committee and the first train built to the specification, the tractor being constructed by Leyland Motors Limited, was sent to the Golf Coast where it is still performing very successfully. The second, with an oil engine providing the power, built by the Associated Equipment Co. Ltd., was, as detailed in the article referred to above, thoroughly tested in the interior of Australia, and fully proved its reliability and capabilities.

Basically the A.E.C. tractors for the two trains sent to Russia are similar to that tested in Australia and they are to haul three Dyson trailers, comprising one with a hopper body for grain carrying, one with a 2,500 gallon tank and one with a two section drop-sided body, each section having a hand-operated side tipping device. An additional item of equipment on each of the tractors is an Albany type pump for filling and emptying the tank-trailer; it is mounted on the near side of the chassis behind the gearbox, from which it is driven. Power is provided by a six cylinder A.E.C.-Ricardo oil engine mounted high in the chassis, with a radiator placed at the back of the driver's cab. There is a four-speed gearbox, with an auxiliary gearbox having three forward combinations. A worm drive is employed for the four axles of which the rearmost has a train of three gears; that at the top is driven from the auxiliary gearbox by a propeller shaft and thus the distance between the centre lines of the engine shaft and the drive to the axles is satisfactorily bridged. As the differential gears in the centres of the axles are independent of each other wheel-spin on one axle has no effect on the other three. With the engine running at 2,000 r.p.m. the two gearboxes provide ratios permitting speeds ranging from 2·56 m.p.h. to 28·4 m.p.h. to be obtained.

Braking is by the Westinghouse system with air storage tanks at the rear of the driver's cab. It operates on the four centre wheels of the tractor and there are two control valves, one operating slightly before the other so that when the pedal is depressed the brakes on the trailers are applied in advance of those on the tractor so effectively preventing the former swinging round. The trailers, each carried on two bogies so interconnected that the vehicle follows in the track of the preceding one, are braked on two diagonally opposite wheels of each bogie.

Before leaving this subject it is not amiss to observe how much progress has been made in the last quarter of a century, for in 1910 a considerable amount of attention was given to the matter as the result of successful trials of the Renard road train, developed by the Daimler Co. Ltd., from a design by Col. Renard. That had a four-wheeled tractor, termed a locomotor, fitted with a sleeve valve engine of 80 h.p., and it actually drove the three six-wheeled trailers, through a shaft having universal joints at the front and back of each unit and a differential gearbox and double chain drive on to the centre axle. The other four wheels on each trailer were steered so that it will be gathered the design was not nearly so simple as the schemes of today. Examples of these trains were supplied to Australia, Canada and India, where good work was carried out.

The road train recently delivered to the Union of Socialist Soviet Republics comprises an A.E.C. oil-engined tractor and three Dyson trailers. They are based on the specification drawn up by the Oversea Mechanical Transport Directing Committee and embody the experience gained with the first two units in the Gold Coast and Australia respectively

XUM

Karrier Colts at Lourenço Marques

The virtues of the mechanical horse type of tractor, as well as those of a load carrying vehicle of similar design are now being appreciated abroad as well as at home. We have recorded in these pages that the South African Railways and Harbours have placed Karrier Cobs and Colts in service and during the last month or so four Karrier Colts—one of which is seen in the photograph we reproduce—have been sent to Lourenço Marques in

One of four Karrier Colts which have been supplied to the authorities at Lourenço Marques for use on the water-front in the port

Portuguese East Africa for service in the confined areas of that port. These machines are fitted with the four-cylinder Karrier 10-30 h.p. petrol engine and are mounted upon 22 in. by 5 in. single solid tyres. The platform measures 6 ft. 6 in. by 4 ft. and is of diamond steel plate, and the vehicle, which weighs approximately 25 cwt. complete, carries a pay load of 40 cwt. It has a turning circle of 18 ft. and it is hoped that their handiness will appreciably reduce the congestion on the front at this port. It will be noticed that a spring drawbar is fitted at the rear so that trailers may be dealt with, if required.

Replacing a Railway

In the July number of the Leyland *Journal* there is a brief note on the closing of the 50-mile Clifden-Galway route of the Great Southern Railways and the motor services which now supply the transport for the district. There are four buses and seven goods vehicles in service, the latter being of the Leyland Cub type, which suit the narrow roads over the bogs, while the three-axle machines enable the load to be distributed as evenly as possible, and it is useful to have both rear axles driven so as to assist in pulling the vehicle out should it get into soft ground.

A.A. Handbook Supplement

There are many motorists who know the value of the A.A. handbook and especially appreciate the handiness of its form. It now has a companion in the Supplement giving particulars of nearly 4,000 hotels, boarding houses, restaurants, &c., which, owing to space restrictions, could not be included in the handbook itself. They have all been inspected on similar lines to those which govern the A.A. full hotel appointment so that members may rely upon cleanliness and good plain food, representing value for money, when using these establishments. In the centre of the book there are sectional sketch maps and this year there is placed against each place name in the book a reference which enables its position to be easily located on the maps. Each place has its accommodation and tariff listed in the same brief but clear way which has proved so successful in the A.A. handbook itself.

A Motor Service in Mysore State?

In accordance with the recommendations of the transport committee appointed by the Mysore Government to report on the measures needed for the regulated development of road motor services in the State, the Railway Department of the State is working out plans for the operation of motor omnibus services on a few selected routes, either parallel to the railway or in other areas. The final scheme will shortly be submitted to the Government for approval. The success achieved by the Nizam's State Railway in the operation of road services has, no doubt, encouraged the Mysore Government to follow suit in co-ordinating road and rail transport.

Leylands for S.A.

In a recent issue reference was made to the increasing demand for passenger accommodation on some of the road motor services maintained by the South African Railways and Harbours where, however, the traffic is not sufficient to justify the use of purely passenger vehicles. Single-decked, dual-purpose bodies originally designed for the purpose have had their design modified from time to time to cope with the changing traffic, and the latest types are proving very popular. Their success has led to the placing of further orders for chassis in this country, one of the most recent being that for 23 Leyland Terriers for this work.

The Latil Tractor

An exhibit at the Royal Agricultural Society's Show at Newcastle-on-Tyne this week which has attracted a good deal of attention is the British Latil tractor, equipped for timber hauling. This outfit includes the special spud adhesion device for operation over soft ground and a heavy duty three-speed winch so that the tractor can go into the forest and haul the butt to the drag, assist in its mounting thereon and then transport it to the railway or to its destination. There are a number of these tractors already doing useful work in railway service. One of these Latil tractors was awarded the R.A.S.E. Silver medal at the Nottingham Show of 1928.

One of the latest batch of Karrier Cob mechanical horses delivered to the L.N.E.R. This, in uniformity with other mechanical horse units in railway service, includes a driver's two-seater cab without doors, but detachable roll-up tarpaulins are supplied

Dealing with Outsize Loads

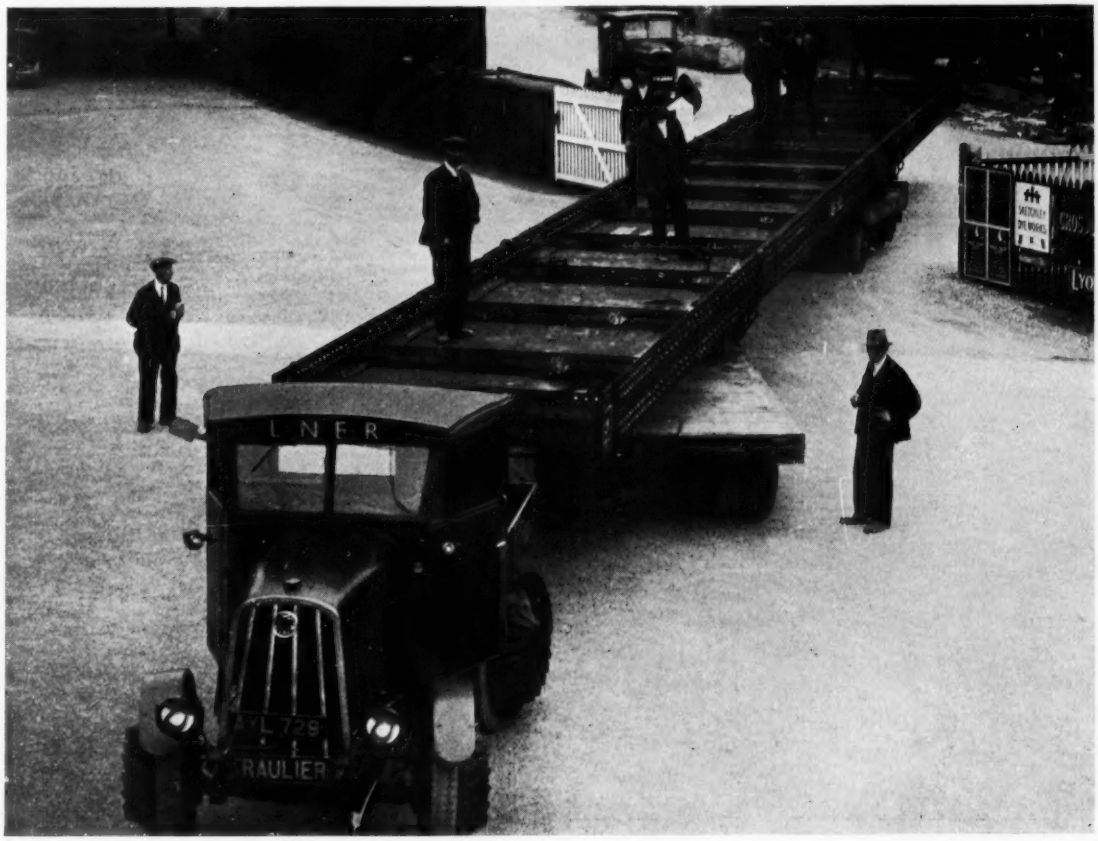
The organisation of the L.N.E.R. heavy haulage department

By A. RALPH WILSON, Cartage Manager, Southern Area, L.N.E.R.

THE problem of dealing with abnormal and indivisible loads is one which has received a great deal of consideration for many years now, and it may be of interest to see how it has been tackled by the L.N.E.R. Railway companies, having to buy the land for railway routes, lay their own tracks and keep them in repair, have naturally adopted the policy of spreading their loads over the greatest possible number of axles and wheels so that the loads on each may be reduced to a minimum. In the heavy haulage section of the cartage department precisely similar principles have been applied, so that in a particular case which occurred recently a 70-ton load was conveyed in such a way that the individual wheel load was only slightly over 4 tons.

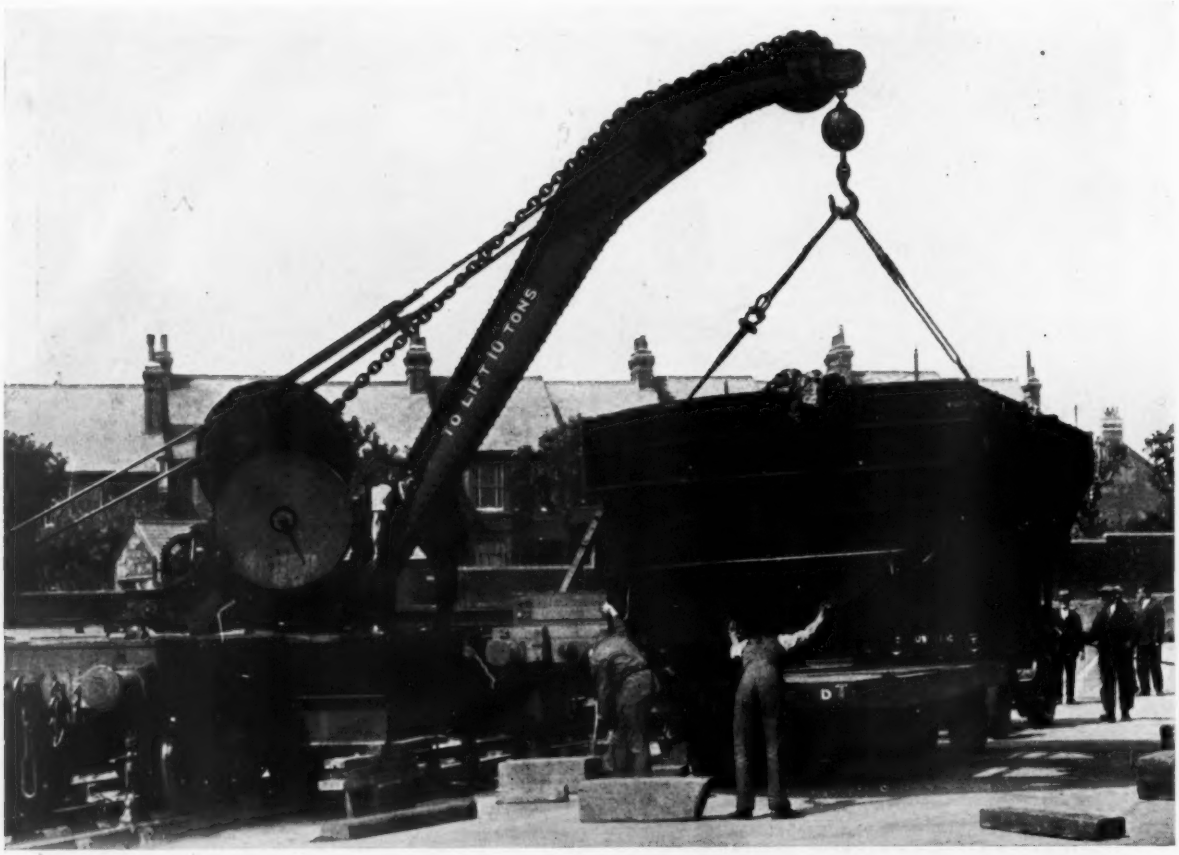
In certain quite clearly defined industrial areas, heavy haulage work is considerable in quantity and quite regular in nature, so that it is an economic proposition to provide special equipment for this class of traffic, but in building up an organisation to cover the whole country, even down to the smallest villages which occasionally require this specialised service, great care must be exercised in the selection of equipment. That provided must, of course, be capable of doing the work for which it is intended, but unless it is to be idle for quite a considerable portion of its time, either because special traffic at a particular place is spasmodic or because it is being moved about from point to point, it must be capable of being put to good use on more normal traffic. Having these two points in mind, it will be seen that if a 20-ton load is of such dimensions as to enable it to be spread over two 10-ton trailers of orthodox type, then not only is the load spread over four axles but the 10-ton trailers can be utilised on more normal traffic far more easily than could one 20-ton trailer.

These guiding principles apply throughout the organisation, and even the 70-ton piece previously mentioned was carried on two 40-ton trailers each having 4 axles and 8 wheels. Similarly, with power units, two 15-ton tractors are of far greater general utility than one 30-ton tractor. Lest it be imagined that this "make up" type of equipment proves cumbersome in actual practice, it may be as well to stress the fact that since both trailers have forecarriages it is a perfectly simple matter to control the steering of the rear trailer and so obtain a degree of manœuvrability not attainable with a single fixed vehicle.



A girder, 93 ft. long and weighing 27½ tons, was carted from Luton goods yards to premises in George Street. In some places there was only an inch to spare when rounding corners

Forty looms were carted from Keighley to Denholme, a distance of 9 miles. They were loaded by means of the hand crane from Keighley goods yard and towed by the Karrier Cob tractor, which returned to fetch another loom while the previous one was being unloaded



Several condenser sections, each weighing 9½ tons, and measuring 21 ft. 6 in. by 12 ft. 6 in. by 7 ft., having been railed from Newcastle-on-Tyne to Brighton, were loaded on trailers and carted to site

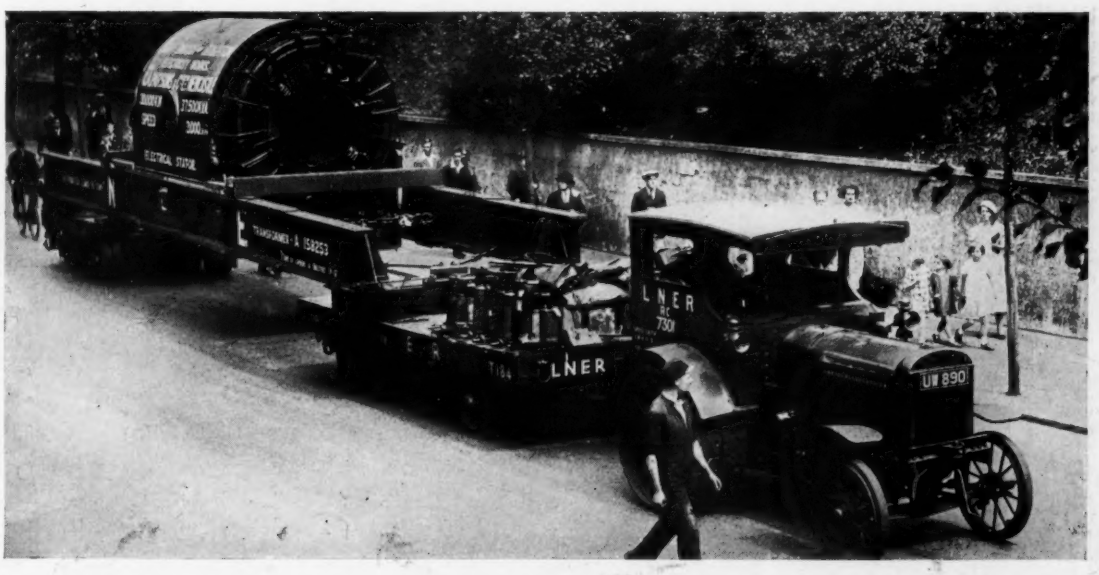
In point of fact, two 10-ton trailers are frequently used for comparatively light but lengthy girders, on account of the ease with which the combination can be worked round awkward corners.

Haulage is, however, by no means the most difficult part of the section's work. More and more are manufacturers asking for a complete service, including the placing of machinery on prepared bases, the landing of boilers on prepared seats, bricking up fire arches, connecting up pipes and fittings, and even hydraulically testing the erected job. All this work is now being done as part of the daily round.

Four rail wagons are fully fitted with a comprehensive set of jacks, rope and chain tackle, rolling gear, turntables, plates, packing and the many odds and ends that go to make up the equipment of an efficient heavy haulage gang, and they move round the system from job to job. The jacks range from the ordinary 5-ton bottle type to 50-ton ship jacks. The ship jacks have separate pump chambers which are used for hydraulically testing boilers. Probably the most interesting and useful part of this equipment is the rolling gear. For jobs over rough ground and where there is no cause to fear slight distortion of the load, this consists simply of lengths of 90 lb. rail and a number of 3-in. steel balls. One length of rail is placed on the ground on its side; steel balls are then spaced out along the web and another length of rail placed on top. Two sets of these rails and balls are placed under the load, which can then be pushed quite easily to its final resting place.

For more accurate work, and where no distortion of the load is permissible, a more refined type of gear is used. This was produced by C. A. Parsons & Co. Ltd., of Newcastle, and consists of lengths of channel iron and a series of rollers in cages. The turntables are of similar construction and consist of lengths of 90 lb. rail bent to circles, one being placed on top of the other with 3-in. steel balls between. By this means really heavy loads can be milled round through any angle by two men. The total equipment of tractors, trailers, and so on is too extensive to be enumerated, and it must suffice to say in conclusion that the job has yet to come along which cannot be undertaken.

Some of the tools used by the heavy haulage department of the L.N.E.R. for moving machinery of great weight. At the top are lengths of 90 lb. rails on 3 in. balls; in the centre is a turntable designed on similar lines, while, at the bottom, are a pair of rollers for moving boilers and such like when they are being manœuvred into position, during loading or unloading operations, or being taken to their seatings



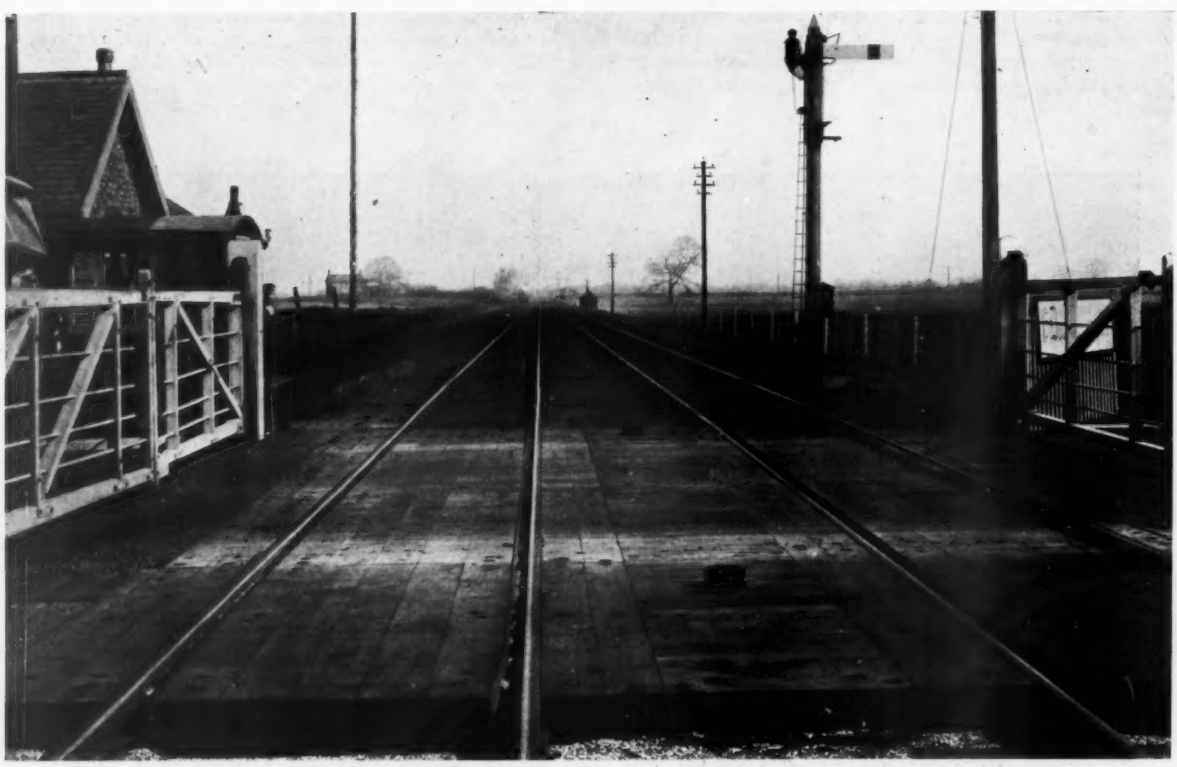
An electric stator, weighing 53 tons, on the last stage of its journey from Newcastle-on-Tyne to the Southwick power station, near Brighton

XUM

Re-Surfacing a Railway Level Crossing

Road view of surface at level crossing

AT a spot where the Great North Road crosses a branch of the London & North Eastern Railway, opportunity was taken when renewing the permanent way to renew the road surface. The track was renewed with flat-bottomed rails on English oak sleepers. A flangeway was provided by means of a steel angle fixed to the sleepers. The road surface was made of English oak 4 in. thick, arranged in panels suitable for removal in order to attend to the permanent way and to the mechanism operating the gates. The road authorities trimmed the adjoining tar macadam road surfaces to suit the plane surface of the crossing. One of the photographs reproduced shows the resulting uniform surface, which has proved to be suitable for any speed of road traffic.

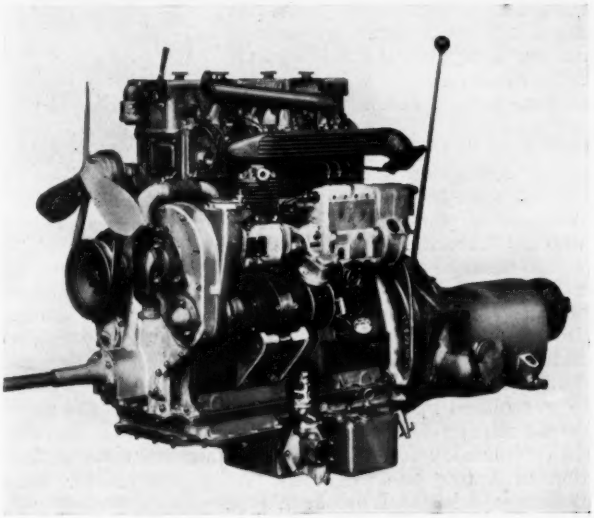


Rail view of road surface at level crossing

Thornycroft Developments

A new type of oil engine is introduced in the rigid six-wheeled models so largely used for railway work in overseas countries

THERE has just been published by John I. Thornycroft & Co. Ltd. a revised edition of the price list and data sheet relating to the rigid six-wheeled freight chassis, known as the Tartar and the Amazon classes, which are being extensively used in railway work in South Africa, South America, India and other countries, and it reveals that a new design of oil engine is available. It is known as the DC4 type and is offered as an alternative to the corresponding four-cylinder petrol engine in the Tartar chassis, while there is a six-cylinder version for the Amazon class. The former, as will be seen from



A general view of the new Thornycroft D.C.4 oil engine developed for use in goods chassis. There is also a six cylinder version available

the diagram, has an excellent performance, the output rising steadily to 66 b.h.p. at 2,200 r.p.m., and the torque curve shows little variation over the speed range from 800 to 2,200 r.p.m.

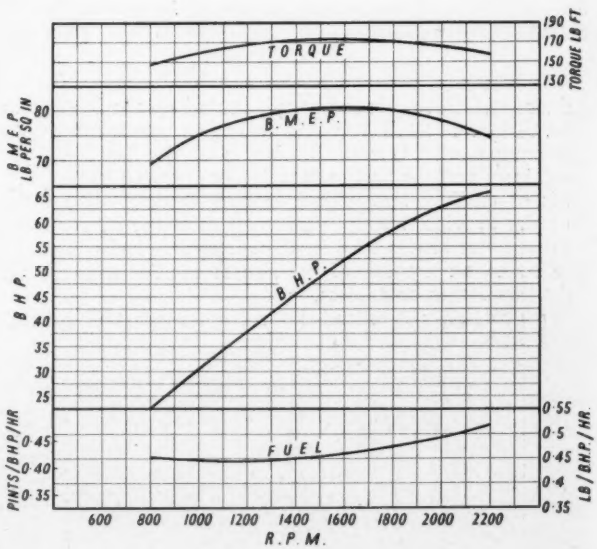
The design embodies all the improvements that experience with earlier types of compression-ignition engines in various parts of the world have shown to be desirable, and naturally the question of weight has been given special attention. The use of the latest lightweight alloys for many of the castings, including Elektron and other aluminium alloys, has resulted in the low figure of approximately 19 lb. per b.h.p. being obtained.

The cylinders are in one block with the top half of the crankcase; they are fitted with wet liners and a detachable head, again in one piece, incorporating cylindrical precombustion chambers. It is claimed for this indirect method of injection that it results in a very low percentage of lubricating oil dilution, ensuring adequate lubrication of the cylinder walls; that the increased turbulence created by this form of ante-chamber results in a purer combustion mixture and a clear exhaust; that injectors are less likely to become choked; while it permits the employment of a low injection pressure of 1,300 lb. per square inch.

To aid quiet running, a special air intake system has been adopted, with ports in the cylinder block that register with slots in the aluminium valve cover, and this scheme also enables the air to be heated before being drawn in through the inlet valves. A decompressor is provided to facilitate turning the engine by hand for valve adjustments or it may be used to ease the starter in very cold weather.

From the illustration of the complete engine the compact and clean general design will be observed. All the auxiliaries, the dynamo, fuel pump, fuel filter, lubricating oil filter and water pump being fitted on the near side, there is ample accommodation for the driver when the engine is installed in forward control chassis. There is also a six-cylinder version of this new engine available for use in the Amazon and other types of chassis. The four-cylinder model has a bore of $4\frac{1}{8}$ in. and a stroke of 6 in., so that the cylinder capacity of 320 cu. in. (5,255 c.c.) and the R.A.C. rating 27·23. The same cylinder dimensions characterise the six-cylinder type—known as the DC6—of which the R.A.C. rating works out to 40·8.

With the alternatives provided by these new engines there are now four models of the Tartar rigid six-wheeled chassis, to deal with pay loads of four tons, including



Torque, B.M.E.P., B.H.P. and fuel consumption curves showing graphically the good performance of the latest Thornycroft compression-ignition engine

normal and forward control types; while there are also four variations of the Amazon for seven-ton loads, there being alternative mean wheelbases of 14 ft. 3 in. and 18 ft. The data sheet gives full dimensions with regard to space available for body, loading height and so on, as well as the shipping dimensions and f.o.b. charges at London or Southampton.

XUM

Containers in Sweden

About a year ago information was sought from the Railway Research Service on behalf of a group of private railways in Sweden as to the containers used on British railways and Mr. A. Lilliendahl, accompanied by Mr. Erik Anderson, managing director of the Stockholm-Nynäs railway came to this country to study their use. Subsequently, Mr. Anderson decided to start as an experiment, a container service over his company's route between Stockholm and Visby and Mr. Lilliendahl was commissioned to design the equipment. Our illustration is of the first of these containers and the first to be actually operated in Sweden. It is of medium size with a loading capacity of 2 tons, in order to keep it within the compass of the average size of the motor lorries used in the country and also because the boats, on account of the size of the hatches, cannot take any larger containers.

One of the new 2 ton containers placed in service by the Stockholm-Nynäs railway, for transport to and from the island of Gotland

The container is intended for the transport of general merchandise and it has been constructed for crane operation as well as for moving on its own rollers, and it is being used from Stockholm to the island of Gotland, via the sea port of Nynäshamn. As soon as the experiments have shown how the loading and accommodation of the containers can be arranged on board the rather small boats it is intended to organise a regular service over this route.

I.A.E. Repair Certificates

In accordance with the modern tendency to draw up registers of competent persons offering to carry out work of a responsible nature, the Institution of Automobile Engineers has opened a register for "I.A.E. Qualified Repairmen." The title to a place in this register may be sought by any motor mechanic or electrician who is over 23 years of age, who can satisfy the Institution as to character and who is willing to submit to a test. For those born before January 1, 1900, the test is of an entirely practical nature, but younger candidates are required to sit for a written examination, besides offering themselves for a practical test. Distinction is drawn on the I.A.E. Register between mechanics and electricians, and the tests, both written and practical, are of two kinds. Candidates who are successful in gaining admission to the register are awarded certificates and conspicuous coloured badges, which indicate whether their qualifications are for mechanical or electrical or both. The tests demand nothing beyond the abilities of a properly trained and experienced man, and success in them confers the right to a visible mark of distinction which in time is likely to be required by both customer and employer. Complete details relating to the I.A.E. Repair Certificates, together with application forms, can be obtained from the Institution of Automobile Engineers, Watergate House, York Buildings, Adelphi, London, W.C.2.

One of the I.A.E. certificates

Climbing in Devon

With so much beautiful scenery in its territory the Devon General Omnibus and Touring Co. Ltd. organises a wide range of tours and excursions during the summer season. They are operated by Grey Cars Limited, a subsidiary purchased in 1932, with a fleet which consists of 23-seater coaches, having as their basis A.E.C. Mercury petrol-engined chassis and a number of 26-seater A.E.C.-Ranger vehicles. The greater number of the tours start and terminate in Torquay, where the company has its own booking office and a garage covering over 40,000 sq. ft. built at a cost of £35,000. The trips range from 3-day tours of 314 miles to Newquay, Lands End and the Lizard, to afternoon runs of 30-40 miles to such places as Widecombe—where one of the Rangers is seen on the long, stiff climb — Teign Valley, Haytor Rock, Dartmoor and Buckfast Abbey.

BEYER-GARRATT LOCOMOTIVES IN ALGERIA

Results obtained under test and service conditions with the Beyer-Garratt articulated locomotives on the Algerian Railways

Beyer-Garratt locomotive, Algerian Railways, after application of Cossart valve gear

FOUR Beyer-Garratt articulated locomotives of the 4-8-2 + 2-8-4 type, built by the Société Franco-Belge de Matériel de Chemins de Fer, of Raismes, France, in close collaboration with Beyer, Peacock & Co. Ltd., were delivered to the Algerian Railways early in 1932 for service on the 3 ft. 5½ in. gauge Blidah-Djelfa section. They were illustrated and described in THE RAILWAY GAZETTE of February 5, 1932, and were followed later the same year by a 4-6-2+2-6-4 standard gauge express Garratt locomotive for service on the Algiers-Oran main line of the Algerian Railways. The latter locomotive was the subject of an illustrated description in our issue of August 5, 1932. The following notes on these locomotives by M. Fleury, Assistant Locomotive Engineer of the Algerian Railways, appeared in a recent issue of the *Bulletin P.L.M.*

This locomotive is the prototype of 12 new articulated locomotives of the same general type which, as we recorded in our issue of March 15, 1935, have been ordered for the Algerian Railways. It should be noted that the problem of hauling fast trains on this system involves difficulties rarely encountered elsewhere, since, on the same lines, there are inclines of 23 mm. per m. (1 in 43), with numerous curves and reverse curves of 275 to 300 metres radius, and zones where the authorised speed reaches 120 km.p.h. (75 m.p.h.). Moreover, the weight per axle is limited to 18·5 metric tons. Finally, the quality of the water is bad, necessitating special attention to boiler design.

After a series of tests on the P.L.M. main line in France, the standard-gauge Garratt arrived on the Algerian Railways in February, 1933. Since then, various modifications have been introduced—separately, in order that the effects of each might be determined accurately by practical tests. Among the principal features which it has been decided to incorporate in the standard type of this series are:—

A.C.F.I. feed heater with delivery regulator.

Variable blast pipe (*à croisillons*) and double chimney arranged transversely across the engine.

Poppet valve distribution on the Cossart system, with electrical control of reversing gear and by-pass of inlet and exhaust valves.

It may be added that oil firing is under investigation, and will be applied in the near future.

The ability of the locomotive to haul very heavy loads on gradients is remarkable. It has hauled as much as 790 metric tons on a 20 mm. per m. (1 in 50) gradient at

Beyer-Garratt locomotive, Algerian Railways, on the metre gauge Blida-Djelfa section

15 km.p.h. (9·3 m.p.h.). At the same time, the locomotive is equally good for high speeds; it has frequently reached 120 km.p.h. (75 m.p.h.), and, on trials, has even been pushed up to 132 km.p.h. (82 m.p.h.). Its running over sharp curves is satisfactory, and no reaction is felt in the cab, where the personnel enjoys comfort such as cannot be afforded by a locomotive of standard type. Also, the Permanent Way Department has confirmed the absence of unfavourable reaction on tracks and structures.

During a recent trial, hauling a 400-metric-ton train on the Algiers-Oran line (two-thirds single track), the distance of 421·7 km. (262·6 miles) between these stations was covered in 6 hr. 26 min. At the time of this trial, the journey included 11 min. for speed reduction on various works in progress, and stops at intermediate stations amounted to 42 min.

The Garratt locomotive is at present hauling certain fast trains between Algiers and Affreville, this being the hilliest portion of the Algiers-Oran line. It avoids double-heading between El-Affroun and Affreville in one direction and between Affreville and Miliana and between Chiffa and Blida in the opposite direction, representing a saving of 138 locomotive-km. on a train journey of 239 km. Also, it frequently avoids the running of trains in two parts.

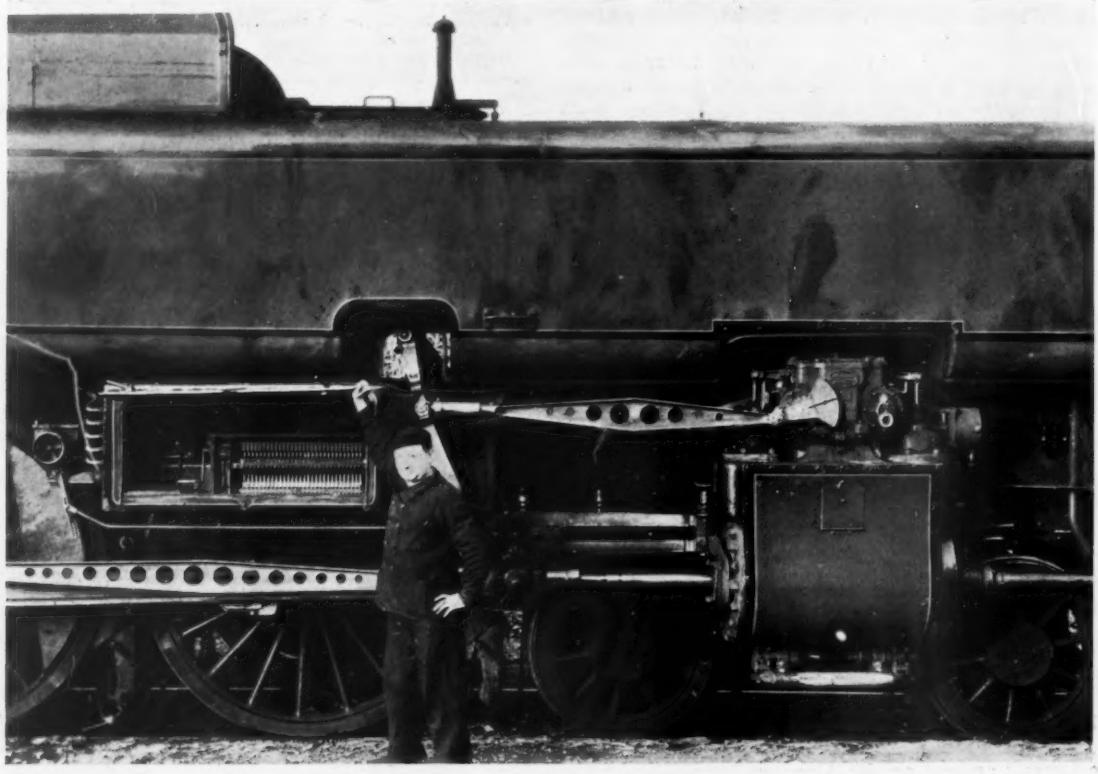
No difficulty is experienced in regard to the articulated steam connections and the pivots. Finally, synchronism of driving effort on the two trucks is established without any reaction or irregularity on the locomotive or in the train.

These results, closely followed by the Services Techniques du Gouvernement Général de l'Algérie, have removed the prejudice which at first existed against the use of Garratt locomotives for fast trains. This favourable opinion resulted in the ordering of the 12 new articulated locomotives (already referred to) having the same general characteristics as the Garratt VN except that the boiler will be designed for about 10 per cent. higher power. The new Garratts will operate on the hilliest sections of the Algiers-Oran and Algiers-Constantine lines, hauling trains consisting of all-steel stock now under construction, thereby affording substantial advantages in speed and comfort.

The results obtained since the placing in service of the Garratt articulated locomotives of the Blida-Djelfa line are shown by the following table which indicates the consumption per 100 gross tonnes-km., the mean tonnage hauled per locomotive-km., and the cost per 100 tonne-km. hauled—on the one hand for the Garratt articulated locomotives, and on the other for the remaining locomotives of the Blidah depot:—

Year	Mean tonnage hauled		Consumption per total 100 tonne-km.		Cost per 100 tonne-km. hauled		Percentage saving of fuel by Garratt locomotives per ton hauled
	Garratt	Others	Garratt	Others	Garratt	Others	
	Tons.	Tons.	kg.	kg.	fr.	fr.	
1932 ..	276	101	8·100	7·910	12·245	12·613	2·92
1933 ..	313	103	7·690	8·230	11·150	13·000	14·23
1934 ..	309	101	7·310	8·070	10·645	12·870	17·29

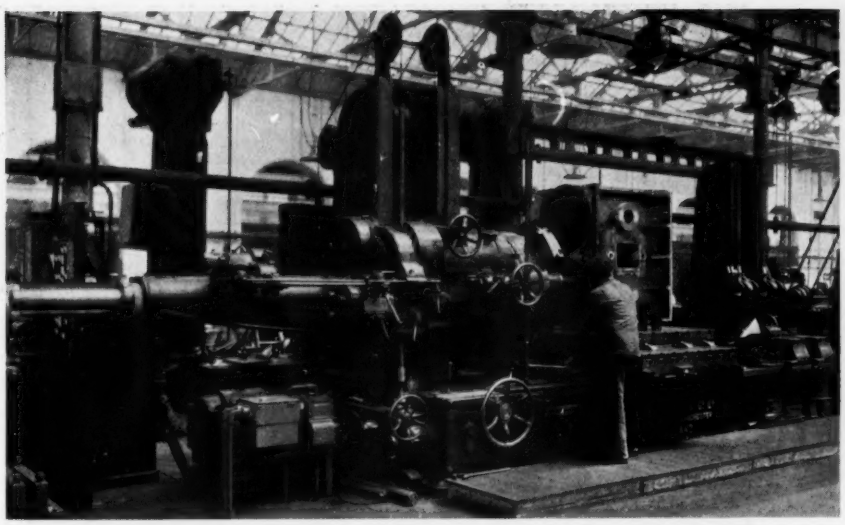
This table shows that the mean load hauled by a Garratt articulated locomotive is three times that of the other locomotives, resulting in an important reduction in train mileage. Also, the saving in fuel per ton hauled has increased continuously since the articulated locomotives were put in service, owing to their better utilisation and to the personnel adapting themselves so well to the driving and maintenance of these locomotives.



Beyer-Garratt locomotive, Algerian Railways, after alterations, showing Cossart valve gear and electric contact box for altering cut-off of valves

MACHINING LOCOMOTIVE CYLINDERS

Details of a new machine recently installed for this operation at the Derby works of the L.M.S.R.

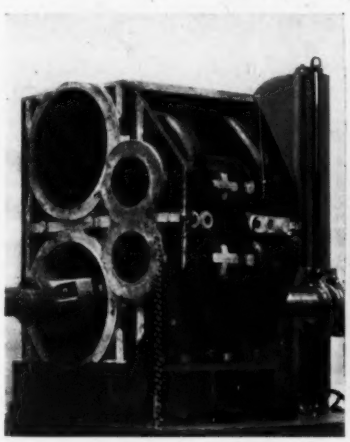


THE machining of locomotive cylinders involves several operations which formerly were carried out on different machines, but nowadays, with the advance in machine tool design and construction, it is possible to perform most, if not all, at the one location. The machine tool illustrated and described herewith is an example of this practice; it is a No. 5 Pearn-Richards universal surfacing, boring, milling and tapping machine with traversing spindle, manufactured by George Richards & Co. Ltd., of Broadheath, Manchester, and installed at the Derby works of the London Midland & Scottish Railway. Although principally engaged in carrying out the operation referred to, it is, of course, adaptable to other work as well, being of increased capacity in several directions as compared with the standard model. It incorporates a travelling spindle and automatic facing head, whilst automatic feeds are provided to the table in the longitudinal and transverse directions, and to the spindle frame vertically. Two boring stays are provided to give added support to long boring bars.

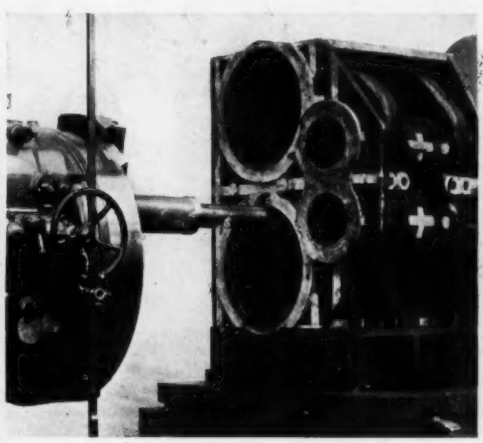
The upright on this machine is of an entirely new design incorporating Richards' patent prismatic slide, by which the cutting forces are distributed over a large area. This type of slide shows to a very great advantage when the machine is used in intermittent cutting or heavy duty, not only ensuring absolute steadiness but also extreme accuracy. The guideways of the bed are protected by sliding covers to prevent damage from cuttings or other extraneous matter falling thereon. Rules and verniers are attached to the spindle frame and boring stays in the vertical and to the table in the transverse direction, whilst a depth rule with vernier is also provided at the front of the bed for gauging the depth of the stepped bore in the valve chests. Magnifying glasses facilitate the reading of the verniers, and adjustment to ·001 in. is easily and rapidly made. The spindle has a total traverse of 5 ft. and the facing capacity of the machine is 54 in. The vertical adjustment of the spindle is 4 ft 3½ in., and the longitudinal and cross traverse of the table 72 in.

The main table is 7 ft. 3 in. long by 4 ft. wide and the top revolving table is 5 ft. square. The latter is provided with the Richards' patent squaring lock, which ensures correct alignment between the four sides of the work. The cylinders shown in the illustrations are of 20½ in. diameter and are 32½ in. long and the time taken to machine one of the cylinders is 28 hr. 10 min. less 1 hr. 43 min. if the clearance for the piston head at the bottom of the cylinder is not to be machined.

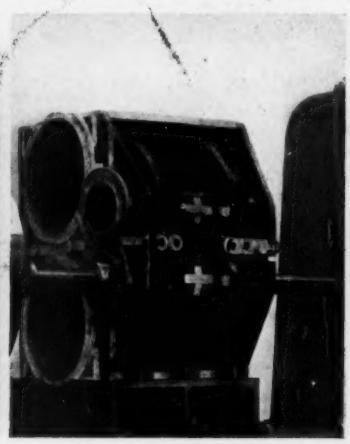
In the accompanying illustration the machine is shown complete and in use at the L.M.S.R. works, Derby, whilst the smaller illustrations show two additional operations being performed on the same cylinder casting.



Boring cylinder barrel

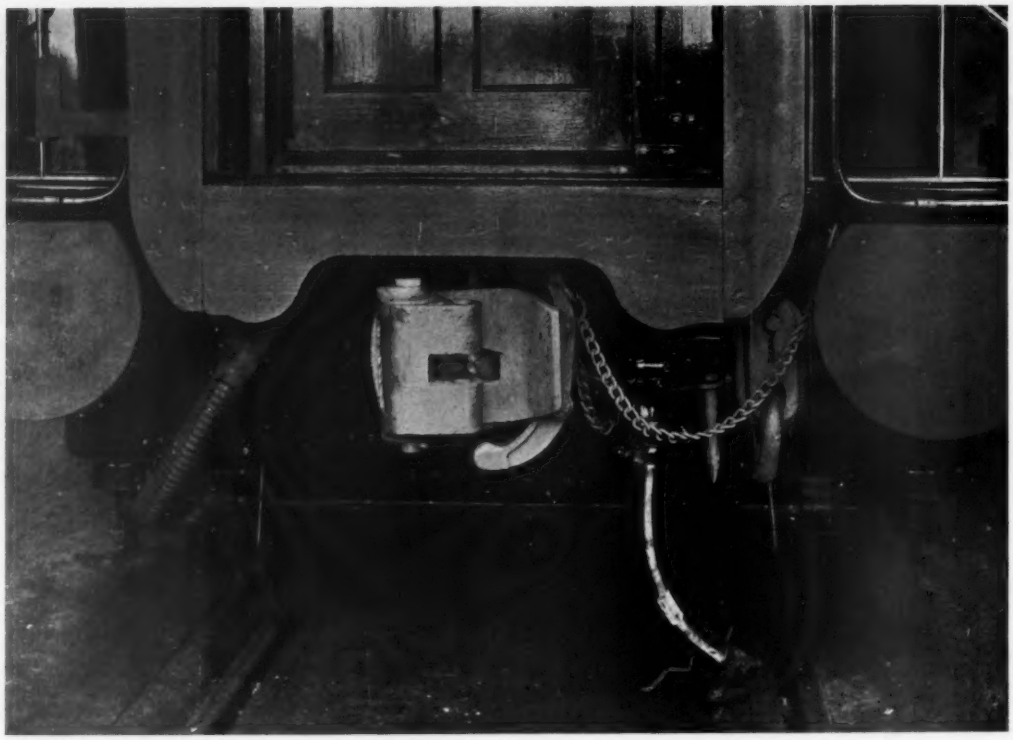


Facing front of cylinder barrel with snout

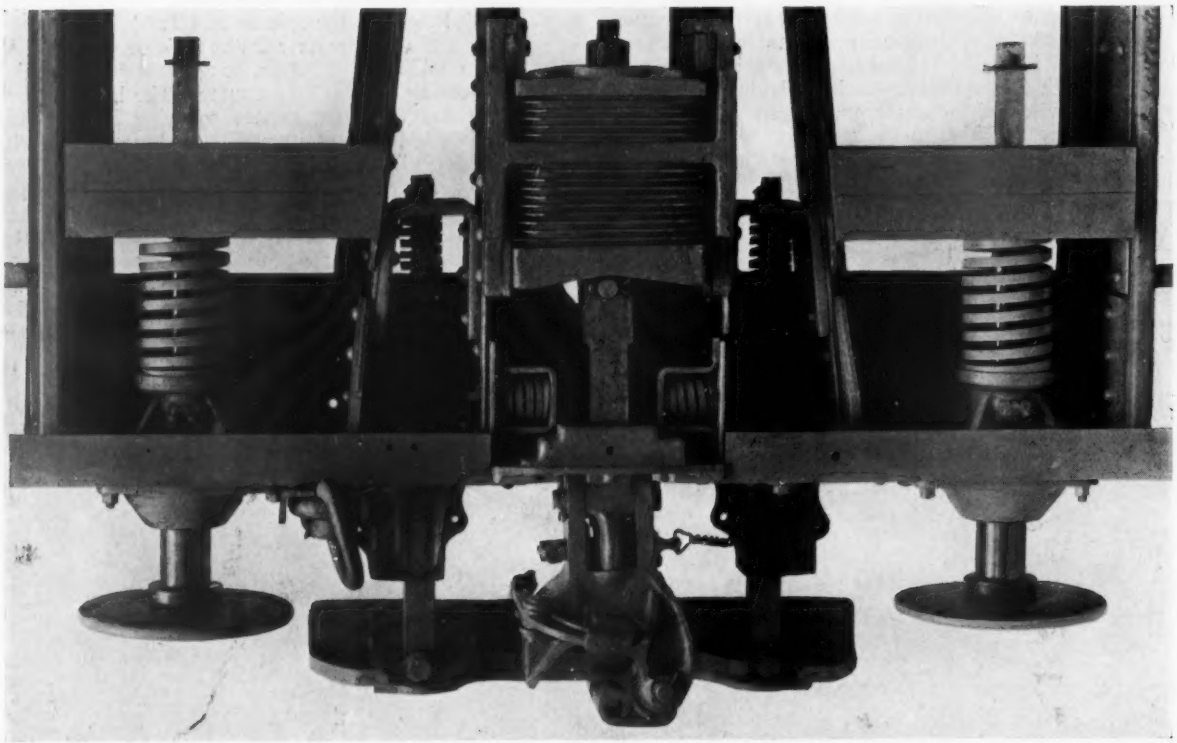


Boring a piston valve chamber

XUM



End view of coupler and Pullman type vestibule



View of coupler and buffing gear from below

THE BUCKEYE COUPLER

(Described in an article and commented upon editorially in our last issue)

RAILWAY NEWS SECTION

PERSONAL

On July 1 the King conferred upon Mr. Edward W. Beatty, K.C., LL.D., Chairman and President of the Canadian Pacific Railway, the honour of Knighthood and invested him with the Insignia of a Knight Grand Cross of the Most Excellent Order of the British Empire.

Sir Henry P. Burt, K.C.I.E., C.B.E., has, after 16 years' tenure of that office, resigned the Chairmanship of the Royal Society of Arts Albert Medal for 1935, for his research work and services to the steel industry. It will be presented to him by the Duke of Connaught early this month.

Mr. Frank Henderson, Chairman of the Central Uruguay Railway of Monte Video and Associated Lines and of other South American systems, whose death we announced in our issue of June 28, was born in 1858. He began his railway career on the Cartagena Railway and was afterwards Manager or General Manager of the Taltal Railway, Chile,

Photo. [*Lafayette*

The late Sir Lingard Goulding, Bart.,
Chairman of the Great Northern Railway (Ireland), 1934–35

The late Mr. Frank Henderson,
Chairman of the Central Uruguay Railway of Monte Video and Associated Lines, 1908–34

Sir Lingard Goulding, Bart., Chairman of the Great Northern Railway (Ireland) and a Director of the Metropolitan-Vickers Electrical Co. Ltd., whose death we recorded in our issue of June 28, was born in 1883. He was educated at Eton and Oxford and saw war service from 1914-19 in the Yeomanry, in the 4th Extra Reserve Battalion and on the Staff, attaining the rank of Captain. He was Chairman of W. & H. M. Goulding Limited and a Governor of the Bank of Ireland. It was in June, 1934, just over a year ago, that he was elected Chairman of the Great Northern Railway of Ireland.

Sir Robert Hadfield, Bart., F.R.S., M.Inst.C.E., Chairman of the well known firm bearing his name, has been awarded

Bengal and North Western Railway, but retains his seat on the board and also the Chairmanship of the associated Rohilkund and Kumaon Railway. Lt.-Col. T. Gracey, R.E., has been elected Chairman of the B. & N. W. board.

Lt.-Col. W. R. Izat, D.S.O., R.E., has resigned from the board of the Rohilkund and Kumaon Railway, but retains the Secretaryship. Lt.-Col. T. Gracey has been elected a Director in his place.

It is with regret that we have to record the death, on June 26, of Mr. W. R. Burbridge, M.B.E., M.V.O., who, as noted in our issue of January 4 last, was awarded the M.V.O., on his retirement from the Southern Railway, where he was Chief Stationmaster at Dover.

from 1884 to 1890; of the Central Uruguay Railway of Monte Video and Associated Lines (1890-99); and thereafter of the Buenos Ayres Great Southern Railway until 1905. In that year he returned to England and became a Director of the Central Uruguay and associated lines, of which he was elected Chairman in 1908, a position he held until his retirement in November last. He was also Chairman of the Taltal, Buenos Ayres Midland and Chubut Central Railways and of various other companies.

Mr. R. G. MacIver, M.I.Mech.E., M.I.Loco.E., of 19, Old Queen Street, Westminster, London, S.W.1, has been appointed by Flexo Plywood Industries Limited, of South Chingford—which

manufactures veneered and metal-faced plywood—to support its sales organisation as technical representative for railways and rolling stock.

Mr. W. S. Horace Williams, who, as recorded in THE RAILWAY GAZETTE of June 7, has been appointed Divisional Superintendent, Gloucester, G.W.R., with effect from July 1, entered the service of the Great Western Railway in the office of the Superintendent of the Line at Paddington, subsequently occupying posts at Llanelly, Gobowen and Hereford; also in the Advertising Department, Paddington. In March, 1917, he became Chief Clerk to the Divisional Superintendent at Pontypool Road, and in June, 1921, was appointed Assistant Divisional Superintendent, Swansea. In April, 1933, he was transferred to Cardiff in a similar position, and it is from there that he is now transferred to take over charge of the Gloucester Division as Superintendent.

Mr. W. S. Horace Williams,
Appointed Divisional Superintendent, Gloucester, G.W.R.

Mr. N. L. Wallis,
Appointed District Engineer, Abergavenny, L.M.S.R.

Mr. H. G. Fish,
Appointed District Locomotive Superintendent, Norwich, L.N.E.R.

Mr. N. L. Wallis, who as announced in THE RAILWAY GAZETTE of June 7, has been appointed District Engineer, Abergavenny, L.M.S.R., was educated at Repton and the Imperial College of Science and Technology (London University), where he obtained the degree of B.Sc. (Engineering) London, with first-class honours in 1911, and the Diplomas A.C.G.I. and D.I.C. During the following year he obtained practical experience with Humphreys & Glasgow Limited, carburetted water-gas engineers, Victoria Street, Westminster, and from 1913 to 1915 was with the Melbourne Harbour Trust, where he was engaged in various work including the design of the travelling passenger bridges at Port Melbourne. From 1915-18 Mr. Wallis was Designing Engineer to the Australian Commonwealth Lighthouse Service, Melbourne, and designed the Cape Don Lighthouse N.T., and in the two following years was an Assistant to Kay, Macnicol & Company, Consulting Engineers, Sydney, where he was connected with a mechanical coal handling scheme. Returning to England, Mr. Wallis was appointed an Assistant Engineer, Port of London Authority, in 1920, and for five years was employed at the East and West India and Millwall Dock group. In 1925 he entered the service of the L.M.S.R as Resident Engineer for the Broadholme to Ambergate widening scheme, near Derby, but in the following year was transferred in a similar capacity to Heysham Harbour, where he carried out the alterations necessary for the combined Fleetwood and Heysham-Belfast service. From 1928 to 1932 he was Assistant to the District Engineer, Lancaster, with charge of the Fleetwood Docks, harbour and district, where he was responsible for the design of the proposed new dock. It was in 1932 that Mr. Wallis was transferred as Assistant to the District Engineer, Liverpool (Edge Hill), the post he now vacates to become District Engineer, Abergavenny. He became an Associate Member of the Institution of Civil Engineers in 1919.

Mr. J. A. Frampton, who, as announced in THE RAILWAY GAZETTE of June 14, has been appointed District Locomotive Superintendent, Lincoln, L.N.E.R., was educated at Sherborne School and served a premium apprenticeship at the Doncaster Works of the Great Northern Railway from 1902. After five years' experience at the Peterborough sheds on fitting and firing work, Mr. Frampton went in 1912 to King's Cross as Junior Assistant. In 1913 he took charge of the locomotive shed at Hatfield, and after three years' war service in the Light Railways, R.E., Mr. Frampton had charge of the Bradford shed from 1919-30. In August, 1930, he became Assistant District Locomotive Superintendent, Stratford, but in April, 1932, he was promoted to be District Locomotive Superintendent at Norwich, whence he is now transferred to Lincoln in a similar capacity.

Mr. H. G. Fish, who, as recorded in our issue of June 14, has been appointed District Locomotive Superintendent Norwich, L.N.E.R., joined the former Great Northern Railway in 1902, as a premium apprentice at Doncaster carriage sheds and subsequently obtained extensive running repairs and footplate experience. From 1908 to 1914, he was Assistant Running Shed Foreman at those sheds. During the latter year he was, for a time, Locomotive Foreman at Colwick, and was also transferred to York as Assistant to the District Locomotive Superintendent, Doncaster, in charge of the G.N.R. shed at York. Mr. Fish became Assistant to the District Locomotive Superintendent, Peterborough, in charge of Boston shed in 1923, and in the following year was appointed Locomotive Depot Superintendent at Mexboro'. In 1927 he was promoted to be Assistant District Locomotive Superintendent, at Peterborough (1927-32) and at Doncaster (1932-35), and it is the latter post he has now vacated to become District Locomotive Superintendent at Norwich. During the war, Mr. Fish served as an officer in the Royal Engineers (R.O.D.) from 1917 to 1919.

Sir Eastman Bell, Bart., has been elected Chairman of the Buenos Ayres Midland Railway in place of the late Mr. Frank Henderson.

The King has been pleased to confer upon Sir Arthur Balfour, Bart., K.B.E. —whose honour of Barony was announced in our issue of June 7—the dignity of Baron and style and title of Baron Riverdale of Sheffield, in the County of York.

RHODESIA RAILWAY STAFF CHANGES

Mr. E. M. Rice, M.Inst.C.E., Principal Assistant to the Chief Engineer, has been appointed Chief Engineer of the Beira & Mashonaland & Rhodesia Railways in succession to Mr. M. N. Varvill, M.C. Prior to becoming Principal Assistant, Mr. Rice held the position of District Engineer, Bulawayo, for several years.

Mr. S. P. J. Fry, District Engineer, Broken Hill, has become Principal Assistant to the Chief Engineer.

With regret we note the recent death of Mr. Bernal Bagshawe, C.B.E., sometime Chairman of the former Leeds Forge Co. Ltd.

At a meeting of the London & North Eastern Railway (Southern Area) Building Society, Mr. A. E. Dolden, who has so successfully held the position of Chairman for the last 14 years, resigned, and Mr. A. J. Brickwell, C.B.E., late Estate and Rating Surveyor, was appointed Chairman of the Society.

Mr. R. D. Gilchrist, M.P., has been appointed representative of Southern Rhodesia on the Rhodesia Railway Commission, Bulawayo, in succession to Mr. J. R. Fulton. Mr. Gilchrist was Minister for Commerce and Transport in the last Southern Rhodesian Cabinet and was a Government representative at the Railway Conference held at Capetown last year to conclude a new railway agreement.

INDIAN RAILWAY STAFF CHANGES

The following officers of the N.W.R. have been confirmed in their several appointments :—

Mr. H. D. Furley, Chief Operating Superintendent, as from September 26, 1934.

Mr. W. O. Chalk, Deputy Chief Operating Superintendent (Power), same date.

Mr. A. Cooper, Deputy Chief Operating Superintendent (Movement), as from August 20, 1933.

Mr. T. C. Hales, Deputy Chief Commercial Manager, as from August 24, 1933.

Mr. A. K. Homan, Divisional Superintendent, as from September 26, 1934.

Messrs. L. F. Jackson and A. F. Harvey, F.C.H., have been promoted permanently as Chief Engineers, State Railways, as from May 28 and June 3, 1935, respectively.

Lt.-Col. H. L. Woodhouse, M.C., R.E., has been confirmed as Director, Railway Board, as from June 3, 1935.

Mr. P. Hackforth, Chief Engineer, E.I.R., has been granted 20 months' leave preparatory to retirement as from June 24.

Fast Running on the L.M.S.R.

(*See Editorial Note on page* 1)

Two remarkable runs were made from Crewe to Euston on Thursday of last week, June 27. The first was a special speed test with the 4-6-2 locomotive *The Princess Royal*, on the 5.25 p.m. express from Liverpool to Euston, made up for the purpose to a load of 15 vehicles; the second immediately followed this, and was made in the course of ordinary running by a "Royal Scot" 4-6-0 locomotive on the Midday Scot express. The latter had been delayed over 20 min. by a slow train which occupied the road ahead from Lancaster to Preston, and the running south of Crewe was an extremely praiseworthy effort on the part of the driver to recover some of the 22 min. late start from Crewe. The interest of the comparison lies in the fact that both trains had the same number of coaches, though the Midday Scot, owing to the inclusion of two twelve-wheeled dining cars, was the heavier, the tare being 479 tons as compared with the 453 tons of the Liverpool express.

L.M.S.R. CREWE–EUSTON: JUNE 27, 1935

Distance	Train	6.12 p.m.	Speeds	6.40 p.m.	Speeds
	Engine No.	6200		6125	
	Type	4-6-2		4-6-0	
	Load (vehicles)	15		15	
	(tons tare)	453		479	
	(tons full)	475		505	
Miles		m. s.	m.p.h.	m. s.	m.p.h.
0·0	CREWE	0 00	—	0 00	—
1·1	*Basford Wood*	2 35	40	—	—
4·8	Betley Road	6 47	60	9 08	—
8·0	Madeley	10 06	57¾	13 40	43½
10·5	Whitmore	12 33	64½	17 03	—
14·7	Standon Bridge	15 53	80½	21 08	—
19·2	Norton Bridge	19 22	—	25 08	—
21·2	Great Bridgeford	20 56	80½	26 50	72½
24·5	STAFFORD*	23 34	—	29 40	40
28·6	Milford	28 10	69	34 55	—
33·8	Rugeley	32 29	80	39 41	71½
37·1	Armitage	35 00	76	42 28	—
41·8	LICHFIELD	38 40	—	46 38	—
48·1	TAMWORTH	43 19	85½	51 38	77½
	*Mining subsidence**	p.w.s.	—	p.w.s.	30
51·6	Polesworth	46 57	—	56 00	—
55·8	Atherstone	51 05	65	61 18	—
61·0	NUNEATON	55 21	76½	66 25	—
66·7	Shilton	60 00	73½	72 15	—
70·0	Brinklow	62 30	81¾	75 10	71½
75·5	RUGBY*	67 09	—	80 23	45
77·8	*Hillmorton*	69 56	55	—	—
82·8	Welton	74 38	67	89 00	—
88·4	Weedon	78 47	85½	93 40	76½
95·3	Blisworth	84 02	75	99 35	—
98·2	Roade	86 27	71½	102 14	61
105·7	Wolverton	92 10	81¾	108 28	75
111·4	BLETCHLEY	96 43	75	113 28	68
117·9	Leighton	102 00	72	119 21	—
122·0	Cheddington	105 23	71½	123 12	—
126·4	TRING	109 16	67	127 55	54
130·1	Berkamsted	112 21	79	131 33	—
137·2	King's Langley	117 25	86½	137 08	79
141·7	WATFORD	119 55	81¾	139 50	—
144·8	Hatch End	123 03	75	143 15	—
146·7	Harrow	124 28	81¾	144 47	—
150·0	Wembley	126 52	85½	147 23	79
152·7	WILLESDEN JUNCTION	129 33	—	149 26	76½
158·1	EUSTON	—	—	156 32	—

* Speed restrictions

On the 5.25 p.m. from Liverpool, *The Princess Royal*—ably handled by Driver H. P. Smith and Fireman T. B. Pile, of Camden shed—which had already worked the 10.40 a.m. express from Euston to Liverpool, ran to the normal schedule from Liverpool to Crewe, and it was from here that the speed test began. With its schedule of 142 min. over the 152·7 miles from Crewe to Willesden Junction, requiring a start-to-stop speed of 64·5 m.p.h., this is the fastest booking on the L.M.S. system, and it was devised for "Royal Scot" haulage with a tare load not exceeding 360 tons. The Pacific locomotive succeeded in cutting this time, with a train of 453 tons, by 12 min. 27 sec., making the run in 129 min. 33 sec., at an inclusive start-to-stop average of 70·7 m.p.h. Over the 139·5 miles from Whitmore to Wembley an average speed of 73·3 m.p.h. was maintained, and over the 67·2 miles from Welton to Wembley the high rate of 77·2 m.p.h., with this substantial train, was maintained. At eight well-separated points the speed of the train exceeded 80 m.p.h., the highest rate attained being 86·6 m.p.h. for half a mile between Hemel Hempsted and King's Langley, while 85·4 m.p.h. was touched at Hademore (between Lichfield and Tamworth) and in the descent from Welton to Weedon; the inclinations in each of these cases are 1 in 330 to 350. Uphill work was equally notable; up the 3 miles at 1 in 177 between Betley Road and Madeley speed did not fall below 57·7 m.p.h. (from 60 m.p.h. attained up the 1 in 269 from the dead start at Crewe), and the minimum up the long but gradual ascent from Bletchley to Tring was 67·2 m.p.h., this length of 15 miles being completed in 12 min. 33 sec. The actual limits to which speed was reduced at the various service slacks are not given in the official particulars;

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but it may be assumed that the severe slowing over the pitfall at Polesworth cost about 1½ min., leaving a net time of 128 min. from Crewe to Willesden. A very slight easing was made over the curve at Norton Bridge, in addition to the service slacks noted in the log of the times and speeds. It is clear from the times that the recovery of the engine from each slack must have been very rapid.

As regards the working of the locomotive, the usual practice of full regulator was followed, with a cut-off generally maintained at between 15 and 18 per cent., increased to 30 per cent. up the ascent from Crewe to Whitmore, and 25 per cent. on the ascent to Tring summit. This noteworthy performance was rounded off by a very brief stop at Willesden and a smart run from there into Euston, whereby the train arrived at 8.31 p.m., 14 min. early, and in an overall time of 3 hr. 6 min. from Liverpool, which is believed to be the fastest on record, notwithstanding the fact that two intermediate stops were included. On a non-stop basis, assuming similar work north of Crewe to that performed south of that point, it should be possible to run from Liverpool to London in not more than 2 hr. 55 min.

The circumstances in which the Midday Scot, on the same evening, gained 8½ min. from Crewe to Euston, have already been mentioned; they resulted in an overall time of 156 min. 32 sec. for the 158·1 miles, start to stop. As with the Liverpool train, no signal checks were experienced over this section of the run. From Whitmore to Kilburn, a distance of 144·6 miles, the speed averaged precisely 65 m.p.h., and an average of 69·4 m.p.h. was maintained over the 72·3 miles from Welton to Kilburn. It is also worthy of note that from Stafford to Euston (126 min. 52 sec. pass-to-stop for 133·6 miles) the engine was practically working to the schedule of the Comet (allowed 128 min. from start-to-stop) notwithstanding the 479 tare tons of trainload. The speed did not at any point reach 80 m.p.h., but at both King's Langley and Wembley a rate of 79 m.p.h. was reached. As regards uphill work, also, the time of 14 min. 27 sec. from Bletchley up to Tring was most praiseworthy, as, indeed, was the exceptional time of just over 76 min. from passing Rugby to the dead stand at Euston, with a gross load of over 500 tons behind the engine tender. The late start from Crewe was thus reduced to a lateness of arrival of only 13½ min. at Euston. The times of the test run by *The Princess Royal* were recorded by Mr. D. S. Barrie, and of the run on the Midday Scot by Mr. Cecil J. Allen.

On June 30 a further dynamometer car test was made with the same engine and a load of 20 vehicles (461 tons) from Crewe to Glasgow (Central) and back to Crewe, a total distance of 486·6 miles, including the severe gradients up to Shap and Beattock summits. The 37·7 miles from Lancaster to Shap summit involves a climb of nearly 900 ft. vertically, and on the down journey this section was accomplished in 41¾ min. from the Lancaster start. On the first stage of the severe part of the climb, 13 miles from below Milnthorpe to Grayrigg, of which the final 6½ miles are inclined at 1 in 104—124—131—106, the minimum speed was 43 m.p.h. A maximum of 69 m.p.h. on the level at Dillicar preceded the ascent of the Shap incline from near Tebay station to Shap summit box. This climb comprises 5¾ miles, of which 4¼ miles are at 1 in 75; the 5·5 miles from Tebay station to the summit were run in 7 min. exactly, at an average speed of 47·1 m.p.h. and with a minimum of 35 m.p.h. The Beattock bank proper consists of ten miles from Beattock station to Summit box, the gradient varying between 1 in 69 and 1 in 88. This section, begun at 58·4 m.p.h., occupied 16 min. 24 sec., the average speed being 36·4 m.p.h. and the minimum 30 m.p.h.

In the southbound direction the approaches to both the Beattock and Shap summits are less steeply inclined. On the test run, Beattock summit (17·2 miles) was passed in 18 min. 25 sec. from leaving Symington, where the train stopped; a maximum of 67 m.p.h. was attained at Lamington, while after falling to 57·7 m.p.h. on the 1 in 142—152 before Elvanfoot, speed recovered to 64 on the level stretch through that station and fell to only 49 on the two miles at 1 in 99, rising to the summit. Some equally noteworthy work was accomplished on the adverse gradients leading from Carlisle to Shap summit; this distance of 31·4 miles was run, from the Carlisle start, in 37 min., the principal speeds being 45 m.p.h. at Wreay, 53 at Southwaite, 56 at Calthwaite, 65 on the level through Plumpton, a slack to 53 through Penrith station, 49 at Thrimby Grange box and 51 on the final ascent of 1½ miles, at 1 in 106—130 to the summit. The 66·9 miles from Symington to Carlisle were covered in 59 min. 41 sec., at an average speed, start-to-stop, of 67·4 m.p.h., with maxima of 83·3 m.p.h. near Nethercleugh and 86·6 between Kirkpatrick and Gretna. The intervening minimum was 66 at Castlemilk siding. The 41·1 miles from passing Beattock summit to passing Gretna were run in 32 min. at an average speed of 77 m.p.h. This must rank as one of the fastest journeys ever made over Scottish metals.

Analysis of the dynamometer car records for the Crewe-Glasgow-Crewe tests show that coal and water consumption averaged respectively 52·6 lb. (Grimethorpe) and 39·2 gal. per mile respectively, the coal per drawbar horse-power hour working out at 2·88 lb. The locomotive crews comprised Driver H. Wilkinson and Fireman W. E. Robinson of Crewe North shed, Crewe to Glasgow, and Driver J. Marshall and Fireman D. Crawford, of Polmadie shed, Glasgow to Crewe, and Mr. D. S. Barrie timed the train.

East Indian Railway Dinner

The East Indian Railway Annual Dinner was held at the Trocadero on June 28, with Sir Hugh Hannay in the chair. Others present were:—

Sir James Duncan Elliot, Sir Clement Hindley, Sir Philip Sheridan, Sir Seymour Tritton, Col. E. Gastrell, I.t.-Cols. G. Huddleston, A. W. Rendell and W. E. White; Major E. H. Gastrell; Capts. C. Clarke, E. W. Huddleston and W. B. Huddleston; Drs. R. D. Brinton, E. W. Guinness, B. W. Holmes, E. N. D. Repper and Hervey Wyatt; Messrs. F. C. Badhwar, H. Kelway Bamber, G. F. Barnett, J. A. Bell, F. S. Bond, J. Cambridge, A. C. Carr, W. C. Cartland, D. Clarke, H. A. Collett, K. C. De, W. H. Denby, J. T. Derry, A. Devon, D. G. Dickins, R. Dormer, S. T. Dutton, H. G. Emmerson, C. Eyers, J. M. Fenton, H. J. Fereday, J. Fitzpatrick, J. Gately, A. W. Goldsack, A. R. Gundry, P. Hackforth, H. W. C. Halpin, R. C. Harvey, J. Hecquet, C. G. B. Hinchey, J. H. Horniman, F. E. Hough, G. R. G. Huddleston, H. B. Huddleston, R. E. L. Maunsell, W. H. G. McKenzie, E. Moreau, E. G. Moyes, P. G. Murray, A. V. Nicolle, R. G. Peckitt, W. E. Pincombe, F. A. Pope, H. E. Presswell, H. W. Puttick, D. M. S. Robertson, F. E. Robertson, J. D. Rogers, A. D. Ross, C. F. Satow, B. Severs, J. V. Severs, F. A. Sheriff, L. Snelgrove, E. Speechly, W. J. Tomes, J. Tritton, O. R. Tucker, H. C. Wallace, S. D. White, T. A. White, W. A. Willox, C. H. Windle, and A. J. Hervey Wyatt.

The Chairman, after proposing the toasts of "The King" and of "The Queen and other Members of the Royal Family," also proposed that of "The East Indian Railway." Briefly outlining the changes that had taken place upon it of recent years, he referred to the great events in 1925, when the line was taken over by Government, the divisional system was introduced, and the former Oudh & Rohilkund Railway was absorbed by the E.I.R. There were six divisions, and the great difference was that all officers, except a few assistant engineers, were now concentrated at divisional headquarters instead of being distributed over a much larger number of district headquarters, which no longer existed. In 1925, 242 company's officers were taken over by Government, but there were now only 121. In so far as promotion was concerned, 1935 must be considered a "vintage" or "gold rush" year, for out of 20 in all, no fewer than 17 company's officers, including the Agent and five principal officers, were taking leave preparatory to retirement. He then announced that Mr. D. M. S. Robertson had been appointed Agent as from next autumn, when Mr. Venables leaves India for good. Sir Hugh next dealt with the question of company *versus* State railway management, and deduced from his experience that the scope of the former was less restricted.

Returning to the subject of the divisional system, he expressed the view that it was very well suited to India and admirably adaptable to the different railway systems; in fact he

went so far as to state that success on the present E.I.R., including the O. & R.R., could not have been achieved with the old departmental system. The E.I.R. had been fortunate in being able to apply former divisional experience obtained on the North Western and Great Indian Peninsula systems to its own requirements. The divisional system had another great merit, he said, in that it eliminated all the old departmental jealousies very quickly under the reorganisation. Referring to the E.I.R. annual dinner he said that one of its great attractions was its reunion of old friends, in which connection he was glad to see at this one, among others, Col. Rendell and the "huddle of Huddlestons." He suggested that the toast should be honoured with special good wishes to the new Agent: this was acted upon amid applause.

Mr. D. M. S. Robertson, the Agent-elect, briefly responded. The Chairman then proposed the toast of "The Guests," coupled with the name of Sir Seymour Tritton, who suitably replied. Sir Hugh finally proposed the health of the popular secretary of the dinner, "Sammy" Dutton, a toast to which the response was particularly warm. Mr. Dutton in a few words expressed his gratitude.

PARLIAMENTARY NOTES

London Transport Agreement Bill

In the House of Commons on June 27, Mr. Duff Cooper, Financial Secretary to the Treasury, moved the second reading of this Bill. There was one point raised in the debate on June 21 which was not replied to. The question asked was why it was necessary to have a company at all [to act regarding the issue of stock under the agreement], how this company was to be formed, and who were to be the directors. The constitution of the company was now under consideration in negotiations which were taking place between the Government, the Bank of England, and the undertakings concerned. The bank would provide the purely nominal capital which would have to be put up for the company, and they would probably recommend persons to act as directors. As to the necessity of having a company at all, the answer was that the Government were negotiating with three separate companies —the London Passenger Transport Board, the London and North Eastern Railway Company, and the Great Western Railway Company. If the Government had adopted the procedure of simply guaranteeing these companies' loans, it would have meant the issue of three separate sets of stock, three separate guarantees, and three separate applications to Parliament. The method proposed was much simpler and much more expeditious. Another question which had been raised in the previous debate was how the electrification of the proposed railways was to be proceeded with, and from where the electricity supply would be derived. The Ministry of Transport since that date had received a definite undertaking from the chairman of the London Passenger Transport Board to the effect that nothing would be done by the board in connection with reorganising electricity requirements without the fullest consultation with the Minister of Transport.

Mr. Parkinson (Wigan—Lab.) said there ought to be a guarantee that the work would be completed within five years. As to the provision for varying interest rates, he did not think that was desirable. It would be better to have one set rate of interest, say 1 per cent. or 1½ per cent. above the Bank rate. Another point was that the Minister was authorised to agree to the extension of works. If any such works were large they ought to be reported to Parliament.

Sir B. Beauchamp (Walthamstow E. —U.) warmly congratulated the Government on the scheme, but urged the necessity of further facilities on the Walthamstow line. He did not believe that the full financial return from electrification as now proposed would show itself unless the London and North-Eastern Railway Company electrified all their suburban services. He asked the Minister to confer with that company to see whether something could be done to obviate the bottle-neck which always impeded traffic into and out of Liverpool Street.

Mr. Wilmot (Fulham E. — Lab.) pressed the importance of standardised and uniform voltage.

Mr. Hutchison (Romford—U.) advocated the electrification of the loop line between Romford and Upminster and of four lines to Liverpool Street station.

Mr. Summersby (Shoreditch—L.N.) wished to know why it was proposed to substitute trolley vehicles for tramcars on 148 route miles.

Mr. Groves (Stratford—Lab.) wished an assurance that men in the locomotive department would not be thrown on the scrap heap when electric transport was installed. Men over the age of 50 who were essentially locomotive men were not capable of becoming electric train drivers, and people who had been constructing wood bodies were not likely to be engaged in the construction of steel cars.

Mr. Hore-Belisha, Minister of Transport, replying to the discussion, said the rate of interest on the guaranteed loan would be the lowest at which the money could be raised, but it was impossible to say with precision what the rate would be before the actual arrangements for borrowing were made. It was not contemplated that repayment would be made by a sinking fund, but from the proceeds of the stocks issued to the railway companies when the date of redemption of the loan arrived. As to the substitution of trolley vehicles for tramcars, rather than the substitution of motor 'buses, the primary reason was that plant was already in existence and could be utilised. There was no doubt that on grounds of amenity, quietness, agreeableness of travel and freedom from accidents, the trolley vehicle was superior to the tramcar. Taking the whole scheme, there were, of course, gaps in it, the most notable of which was the non-electrification of the lines in the direction of Enfield and Tottenham and in the Walthamstow direction. No scheme that could be undertaken in the period could include every desirable undertaking. Electrification of the Tottenham and Enfield route would be undertaken at the earliest possible moment consistent with economic practicability. As to the voltage to be used on the lines to be electrified, that was governed by an Order which he had apparently made. In making arrangements the Government had inserted provisions that fair terms should be given to those who were employed. It was impossible to say whether in the natural course of things some people would be displaced, but more people would be employed in the end.

The motion for the second reading of the Bill was agreed to.

The Bill was considered in Committee of the House of Commons on July 1.

Mr. Wilmot (Fulham E.—Lab.) moved an amendment to Clause 1 to provide that in the event of any amendment of the scheme of the Bill, no further guarantee should be given until the amendment was approved by both Houses of Parliament.

On a division the amendment was rejected by 140 votes to 27 and the Bill was passed through Committee without amendment.

The motion for the third reading of the Bill was agreed to on July 2.

Questions in Parliament

Portsmouth Electrification

Mr. Summersby asked the Minister of Transport on June 26 if and when a commencement would be made on the electrification of the railway to Portsmouth and to the intermediate towns on the South Coast.

Mr. Hore - Belisha. — The Southern Railway Company inform me that they have arrived at no decision with regard to the electrification of the railway to Portsmouth.

Bishop's Castle Railway

Lieut.-Col. Windsor-Clive asked the Minister of Transport whether his attention had been called to the fact that the Bishop's Castle Railway has been closed; and whether any effort had been made by him to induce the Great Western Railway Company to take over this railway.

Mr. Hore-Belisha.—I have approached the Great Western Railway Company, who inform me that in view of the low economic value of the line they would not be justified in entertaining the proposal.

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NOTES AND NEWS

London Transport Pooling Scheme. — The London Passenger Transport Arbitration Tribunal has formally sanctioned the pooling scheme between the London Passenger Transport Board and the four main line railway companies.

Railway Dividend Announcements.—The dates on which announcements as to interim dividends are likely to be made by the following railway companies are: July 25, London Midland & Scottish and Southern; July 26, Great Western and London & North Eastern; August 2, Great Southern Railways (Ireland).

Buenos Ayres & Pacific Railway.—The directors, with the concurrence of the stockholders' committee, have decided to pay 1½ years' arrears of interest to June 30, 1933, on the 4½ per cent. second debenture stock. The Argentine Great Western Railway Company is to be handed a sum sufficient to enable that company to distribute arrears of interest for the same period on its 4 per cent. second debenture stock.

Agreed Charges.—Twenty-five more applications for the approval of agreed charges have been lodged with the Railway Rates Tribunal, as will be seen from the legal notice published on p. 38. A copy of each application (1s. post free) may be obtained from Mr. G. Cole Deacon, Secretary, Rates and Charges Committee, 35, Parliament Street, S.W.1. Notices of objection must be filed with the Registrar of the tribunal on or before July 25.

Eastbourne-Hastings Electrification.—The Southern Railway electrified extension to Lewes, Seaford, Eastbourne, and Hastings was opened officially yesterday by the Lord Mayor of London (Sir Stephen Killik, K.C.V.O.). A special train conveyed the guests from Victoria to Eastbourne, where a luncheon was given by the Mayor and Corporation of Eastbourne. After taking tea at Bexhill as the guests of the Mayor of that town, the party was entertained to dinner by the Mayor and Corporation of Hastings. The public electric service over the new extensions is to begin on July 7.

Progress of Railway Bills.—The London & North Eastern Railway Bill, which originated in the House of Commons, was read a third time in the House of Lords on July 1, and now awaits the Royal Assent. The Southern Railway Bill was read a third time, with the amendments, on July 1, in the Lords, and passed and returned to the Commons. All opposition in the House of Lords to the London Midland & Scottish Railway Bill has now been withdrawn and it has been referred to the Committee on Unopposed Bills. The London Midland & Scottish Railway Order Confirmation Bill, which is concerned only with Scotland, was read a third time in the Lords on July 2, and passed, and sent to the Commons. A Select Committee of the House of Lords, with the Earl of Iveagh as Chairman, will on Tuesday, July 9, begin consideration of the London Passenger Transport Board Bill, which has already been through the other House. The Finance Bill promoted by the Board in connection with the £40,000,000 Government scheme was presented and read the first time in the House of Commons on June 28, and was certified on July 2 by the Examiners to have complied with Standing Orders.

Road Accidents.—The Ministry of Transport return for the week ended June 29 of persons killed or injured in road accidents is as follows. The figures in brackets are those for the corresponding period of last year:—

	Killed, including deaths resulting from previous accidents	Injured
England	99 (125)	4,742 (4,298)
Wales	7 (5)	233 (178)
Scotland	7 (9)	416 (489)
	113 (139)	5,391 (4,965)

The total fatalities for the previous week were 118, as compared with 133 for the corresponding period of last year.

L.M.S. Turbine Locomotive.—Details of the heating surface of the new L.M.S.R. turbine locomotive, No. 6202, are as follows:—

Tubes	2,097 sq. ft.
Firebox (including combustion chamber) ..	217 ,,
Total	2,314 ,,
Superheater	653 ,,
Combined total ..	2,967 ,,

The grate area is 45 sq. ft., as in the other 4-6-2 engines. These figures supplement the details given on pp. 1251-1260 of our last issue.

Review of Railway Charges.—The Railway Rates Tribunal has delivered judgment following on its review of the standard and exceptional charges of the four group railway companies. The tribunal finds that the deficiencies in 1934 on standard revenues were not due to any lack of efficient and economical management and does not recommend any modification of charges. The judgment is dealt with editorially on page 4.

"Underground" Final Meeting.—The final meeting of the Underground Electric Railways Company of London Ltd., in liquidation, was held on June 27, when Lord Ashfield, the liquidator, submitted an account showing how the winding up of the company had been conducted and the property disposed of. It involved the preparation and issue of stock certificates to 26,500 stock and shareholders, and the distribution of a sum of money in cash in three separate payments to 18,500 shareholders. Receipts during the liquidation amounted to £1,979,312, of which £1,505,814 came from the sale of investments. Of the total disbursements of £1,921,338, the largest item was the purchase of £912,886 of London Transport 5 per cent. B stock from the Transport Board. There was a balance of £58,574 for final distribution to the ordinary shareholders, equal to 1·3137d. a share, payable on July 9.

Turkish Railway Development.—As recorded in our Contracts and Tenders page this week 100 locomotives and 1,500 wagons and passenger coaches for new railways under construction for the Turkish Government, are being constructed by a Swedish firm. A Danish firm is directing the laying of the track, the greater part of the 900 km. of which is in the mountainous regions of Anatolia. These new works are being carried out by a consortium in which both Swedish and Danish interests are concerned, according to a Swedish International Press Bureau message.

Second Class Withdrawn on Newhaven-Dieppe Service.—On and from July 1, the Southern Railway and French State Railways' steamers on the Newhaven–Dieppe route have first and third class accommodation instead of first, second, and third class as heretofore. The quarters on the steamers designated first class will remain first class, but both second and third class accommodation will be allotted to third class passengers. Second class rail passengers will be allowed to travel in first class accommodation on the steamer, and third class passengers will have most of the present second and third class accommodation at their disposal.

Locomotives for Brazil.—With further reference to the paragraph in our issue of June 21 concerning locomotives ordered by the Noroeste do Brazil Railway, we have now received additional particulars from the builders, Borsig Lokomotiv-Werke G.m.b.H., who, it will be recalled, recently took over the locomotive building business of A. Borsig Maschinenbau A.G. The new order for 16 heavy type steam locomotives and tenders consists of eight having the 2-8-2 wheel arrangement and eight having the 4-8-2 arrangement with, in all cases, eight-wheeled tenders. Both classes will have cylinders 19 in. × 21¾ in., and boiler pressure 206 lb. per sq. in. The 2-8-2 will have 3 ft. 6 in. coupled wheels and the 4-8-2 design will have 3 ft. 9 in. coupled wheels. The following are additional particulars respectively for the 2-8-2 and the 4-8-2: weight in working order, engine only 67·5 and 75·3 tons, tender 38 tons each case; tractive effort at 85 per cent. boiler pressure, 33,700 lb. and 31,532 lb.

L.N.E.R. Quieter Night Travel Campaign.—To afford quieter night travel, the L.N.E.R. has decided to fit barrows which are used at stopping places on the route of its principal night trains with rubber tyres, and no fewer than 365 platform barrows are being so equipped. Instructions have been given also that drivers are not to allow their engines to blow off steam

unnecessarily. Similarly, the guard's signal to the driver to start must not be accompanied by a blowing of his whistle unless this is absolutely necessary. In stopping and in starting passenger trains engine drivers have been instructed to regulate their speed so that jerking and jarring is entirely eliminated. Station work has also been completely reorganised so that parcels traffic to be loaded on to the night trains shall be placed in position beforehand, in order to avoid unnecessary movement and noise. The stations principally affected are Grantham, Doncaster, York, Darlington, Durham, Newcastle, Sunderland, West Hartlepool, Stockton, Edinburgh, Hawick, Dunbar, Glasgow, Dundee, Arbroath, and Montrose.

Southern Railway Electrification Extensions.—In our Supplement last week describing the Southern Railway Electrification Extension to Eastbourne and Hastings, the Westinghouse cylinders referred to on page 1296 should have been described as of the Comprestall type—the air type of steel cylinder—and not Prestall, which is the name registered by the Westinghouse Brake & Signal Co. Ltd. for its steel vacuum cylinders.

Closing to Passenger Traffic of Irish Line.—The Cork & Macroom Direct Railway was closed to passenger traffic on and from Sunday last, June 30. The railway, which is now part of the Great Southern system, is 24¼ miles long.

Forthcoming Events

July 5–8.—Institution of Locomotive Engineers, in Belgium. Summer Meeting.

July 6–11.—Permanent Way Institution, at Glasgow. Summer Convention.

July 9 (*Tues.*)—Retired Railway Officers' Society, at Great Eastern Hotel, Liverpool Street, London, E.C. 2, 2.30 p.m. Ordinary Meeting.

July 12–15.—Railway Students' Association, at Chancellor's Hall, Augustus Road, Birmingham. Convention.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 26th Week			Totals to Date		
	1935	1934	Inc. or Dec.	1935	1934	Inc. or Dec.
	£	£	£	£	£	£
L.M.S.R. (6,925¼ mls.)						
Passenger-train traffic...	653,000	619,000	+ 34,000	11,389,000	11,112,000	+ 277,000
Merchandise, &c. ...	454,000	448,000	+ 6,000	11,593,000	11,583,000	+ 10,000
Coal and coke ...	183,000	182,000	+ 1,000	6,125,000	6,113,000	+ 12,000
Goods-train traffic ...	637,000	630,000	+ 7,000	17,718,000	17,696,000	+ 22,000
Total receipts	1,290,000	1,249,000	+ 41,000	29,107,000	28,808,000	+ 299,000
L.N.E.R. (6,336 mls.)						
Passenger-train traffic...	382,000	377,000	+ 5,000	7,381,000	7,185,000	+ 196,000
Merchandise, &c. ...	332,000	332,000	—	8,006,000	8,086,000	− 80,000
Coal and coke ...	201,000	196,000	+ 5,000	5,864,000	6,006,000	− 142,000
Goods-train traffic ...	533,000	528,000	+ 5,000	13,870,000	14,092,000	− 222,000
Total receipts	915,000	905,000	+ 10,000	21,251,000	21,277,000	− 26,000
G.W.R. (3,749¼ mls.)						
Passenger-train traffic...	248,000	223,000	+ 25,000	4,694,000	4,620,000	+ 74,000
Merchandise, &c. ...	187,000	179,000	+ 8,000	4,670,000	4,640,000	+ 30,000
Coal and coke ...	92,000	80,000	+ 12,000	2,584,000	2,610,000	− 26,000
Goods-train traffic ...	279,000	259,000	+ 20,000	7,254,000	7,250,000	+ 4,000
Total receipts	527,000	482,000	+ 45,000	11,948,000	11,870,000	+ 78,000
S.R. (2,171 mls.)						
Passenger-train traffic...	359,000	347,000	+ 12,000	7,059,000	6,914,000	+ 145,000
Merchandise, &c. ...	74,500	72,000	+ 2,500	1,565,000	1,667,000	− 102,000
Coal and coke ...	33,500	29,000	+ 4,500	795,000	830,000	− 35,000
Goods-train traffic ...	108,000	101,000	+ 7,000	2,360,000	2,497,000	− 137,000
Total receipts	467,000	448,000	+ 19,000	9,419,000	9,411,000	+ 8,000
Liverpool Overhead ... (6½ mls.)	1,318	1,216	+ 102	29,610	28,804	+ 806
Mersey (4½ mls.) ...	3,924	3,852	+ 72	104,910	107,553	− 2,643
*London Passenger Transport Board ...	571,000	550,200	+ 20,800	28,020,100	27,427,900	+ 592,200
IRELAND						
Belfast & C.D. pass. (80 mls.)	3,498	3,204	+ 294	54,256	53,571	+ 685
,, ,, goods	583	627	− 44	12,965	13,857	− 892
,, ,, total	4,081	3,831	+ 250	67,221	67,428	− 207
Great Northern pass. (543 mls.)	11,600	11,100	+ 500	234,950	217,000	+ 17,950
,, ,, goods	10,100	9,150	+ 950	236,250	226,750	+ 9,500
,, ,, total	21,700	20,250	+ 1,450	471,200	443,750	+ 27,450
Great Southern pass. (2,124 mls.)	28,016	27,716	+ 300	558,333	551,301	+ 7,032
,, ,, goods	30,308	29,186	+ 1,122	892,854	835,692	+ 57,162
,, ,, total	58,324	56,902	+ 1,422	1,451,187	1,386,993	+ 64,194

* 52nd week, the receipts for which include those undertakings not absorbed by the L.P.T.B. in the corresponding period last year; last year's figures are, however, adjusted for comparative purposes

British and Irish Railways Stocks and Shares

Stocks	Highest 1934	Lowest 1934	Prices July 3, 1935	Rise/Fall
G.W.R.				
Cons. Ord. ...	66½	48½	50	—
5% Con. Prefce. ...	118	109	121	+½
5% Red. Pref. (1950)	115	107	112½	—
4% Deb.	117	105	115½*	+½
4½% Deb.	119	109	115½*	—
4½% Deb.	129½	115¼	127½*	+1
5% Deb.	135	126¼	136½*	—
2½% Deb.	75	64	78*	—
5% Rt. Charge ...	134 7/16	123¼	134½*	—
5% Cons. Guar. ...	132¾	121¾	134½	+1
L.M.S.R.				
Ord.	30½	19½	21	+½
4% Prefce. (1923)	64¼	41	56½	−½
4% Prefce. ...	87	69½	82½	+1
5% Red. Pref. (1955)	107	92½	103½	—
4% Deb.	114⅛	100½	107	+½
5% Red. Deb. (1952)	118 11/16	111¼	115½	—
4% Guar.	106½	96¾	102½	—
L.N.E.R.				
5% Pref. Ord. ...	24¾	13½	12	−½
Def. Ord.	11½	6⅞	6	−¼
4% First Prefce. ...	76	59½	65	—
4% Second Prefce.	47	25½	25	−½
5% Red. Pref. (1955)	94½	80	82½	—
4% First Guar. ...	104	92	100½	—
4% Second Guar.	97⅞	86½	93½	+1
3% Deb.	90	74½	81	—
4% Deb.	114	99¼	106	—
5% Red. Deb. (1947)	117	108	113½	—
4½% Sinking Fund Red. Deb.	111¼	105¼	109	—
SOUTHERN				
Pref. Ord.	90	63½	84	—
Def. Ord.	32⅝	19	23	−½
5% Prefce. ...	118 5/16	107½	121½	+1
5% Red. Pref. (1964)	115¾	107½	116½	+1
5% Guar. Prefce.	132	120¾	133½	+1
5% Red. Guar. Pref. (1957)	119½	113	119½	—
4% Deb.	116½	103¼	113½	+½
5% Deb.	134	124 13/16	133½	—
4% Red. Deb. 1962–67	113 11/16	105 9/16	113½	+2
BELFAST & C.D.				
Ord.	6	5	4	—
FORTH BRIDGE				
4% Deb.	110	100	108½	+1
4% Guar.	110	100	107½	—
G. NORTHERN (IRELAND)				
Ord.	9¾	4 15/16	9	—
G. SOUTHERN (IRELAND)				
Ord.	25	12½	30	+5
Prefce.	21½	13 15/16	38¾	+¾
Guar.	48	39	70¼	+1¼
Deb.	67	59	79	−¾
L.P.T.B.				
4½% "A" ...	126	115	124½	—
5% "A"	135½	124½	134½	—
4½% "T.F.A." ...	113½	107½	111	—
5% "B"	131¾	118	127½	—
"C"	97	73	99	—
MERSEY				
Ord.	15¼	7	12	—
4% Perp. Deb. ...	93½	82½	95½	—
3% Perp. Deb. ...	66½	61½	69½	—
3% Perp. Prefce....	54	44½	52½	—

* ex-dividend

XUM

LEGAL AND OFFICIAL NOTICES

In the Court of the Railway Rates Tribunal

Road and Rail Traffic Act, 1933. Agreed Charges.

NOTICE IS HEREBY GIVEN that Applications for the approval of Agreed Charges under the provisions of Section 37 of the Road and Rail Traffic Act, 1933, short particulars of which are set out in the Schedule hereto, have been lodged with the Railway Rates Tribunal.

The said Applications may be inspected at the Office of the Tribunal, 2, Clement's Inn, Strand, London, W.C.2, at any time during office hours and at the following places:—

LONDON: Railway Clearing House, 123, Seymour Street, N.W.1.

BIRMINGHAM: District Goods Manager's Office, Snow Hill, Great Western Railway.

CARDIFF: Divisional Superintendent's Office, Great Western Railway.

EXETER: Western Divisional Superintendent's Office, Southern Railway.

LEEDS: District Goods Manager's Office, Wellington Street, London & North Eastern Railway.

LEICESTER: District Goods and Passenger Manager's Office, London Midland & Scottish Railway.

MANCHESTER: District Goods Manager's Office, Hunt's Bank, London Midland & Scottish Railway.

SOUTHAMPTON: Southern Divisional Superintendent's Office, Southampton West, Southern Railway.

YORK: Goods Manager's Office, London & North Eastern Railway.

ABERDEEN: District Goods and Passenger Manager's Office, London Midland & Scottish Railway.

EDINBURGH: District Goods and Passenger Manager's Office, Waverley Station, London & North Eastern Railway.

GLASGOW: Commercial Manager's Office, Central Station, London Midland & Scottish Railway.

A copy of each Application lodged with the Tribunal can be obtained from Mr. G. Cole Deacon, Secretary, Rates and Charges Committee, 35, Parliament Street, Westminster, London, S.W.1, price 1s., post free.

Notices of objection by any parties entitled to object to the approval of any of the said Agreed Charges must state concisely the grounds of objection and must be filed at the office of the Registrar, 2, Clement's Inn, Strand, London, W.C.2, on or before the 25th day of July, 1935, and a copy thereof on or before the same day served on or sent by registered post to Mr. G. Cole Deacon, at the above address. A separate Notice must be filed and served in respect of each Application.

Each Notice filed must be on foolscap size paper and must be stamped with an adhesive fee stamp for 2s. 6d. (which can be purchased at the office of the Tribunal only). If sent by post for filing, each Notice must be accompanied by a Postal Order for 2s. 6d. payable to the Registrar, when a stamp will be affixed at the office. A Notice by a Representative Body of Traders must contain a statement of the facts upon which such Body claims to represent a substantial number of traders interested in, or likely to be affected by the decision on, the application.

Four additional copies of each Notice must be lodged with the original at the office of the Registrar.

T. J. D. ATKINSON,
Registrar.

2nd July, 1935.

Number of Application and Date of Lodgment	Parties to Agreement	Nature of Agreed Charge
1935. No. 177—July 1, 1935	J. C. NAYLOR, 21, South Gate, Sleaford, Lincoln, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos. and L.P.T.B. This application, by leave granted under Rule 4, relates also to Agreed Charges with other Registered Bacon Curers in Great Britain as specified therein.	Per pig. Live Pigs consigned to Registered Bacon Curers or their Agents.
1935. No. 178—July 1, 1935	GEORGE BRETTLE & CO. LTD., 119, Wood Street, London, E.C.2, and the G.W., L.M. & S., L. & N.E. and Southern Railway Cos.	Per package. Cotton, Woollen, Silk and Artificial Silk Goods; Gloves; Hosiery; Advertising Matter.
1935. No. 179—July 1, 1935	JAMES CARTER & CO. (CARTER'S TESTED SEEDS LIMITED), Raynes Park, London, S.W.20, and the Southern Railway Co.	Per ton. Fertilisers; Seeds, agricultural, flower and vegetable.
1935. No. 180—July 1, 1935	THE CHISWICK PRODUCTS LIMITED, Burlington Lane, Chiswick, London, W.4, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per ton. Varnishes, Paints, Stains, Enamels, Polishes, Dressings, Tinplates and Returned Empty Tinplate Cradles and trade accessories.
	Applicable also to traffic consigned by two Associated or Subsidiary Companies.	
1935. No. 181—July 1, 1935—	J. A. CRABTREE & CO. LTD., Lincoln Works, Walsall, and the G.W. and L.M. & S. Railway Cos.	Per ton. Electrical Accessories and Fittings; Printed Matter; Empties returned to Suppliers.
1935. No. 182—July 1, 1935—	THE DISTRIBUTORS AND TRANSPORTERS LIMITED (Messrs. Unilevers Distributing Organisation), Unilever House, Blackfriars, London, E.C.4, and the G.W. and Southern Railway Cos.	Per ton. Candles, Soap and Soap with articles for advertisement.
	Applicable to traffic consigned by six Associated or Subsidiary Companies.	
1935. No. 183—July 1, 1935	THE DISTRIBUTORS AND TRANSPORTERS LIMITED (Messrs. Unilevers Distributing Organisation), Unilever House, Blackfriars, London, E.C.4, and the G.W. and Southern Railway Cos.	Per ton. Margarine, Lard and Lard Substitutes.
	Applicable to traffic consigned by three Associated or Subsidiary Companies.	
1935. No. 184—July 1, 1935	THE DISTRIBUTORS AND TRANSPORTERS LIMITED (Messrs. Unilever's Distributing Organisation), Unilever House, Blackfriars, London, E.C.4, and the G.W. and L.M. & S. Railway Cos.	Per ton. Candles, Soap and Soap with articles for advertisement.
	Applicable to traffic consigned by four Associated or Subsidiary Companies.	
1935. No. 185—July 1, 1935	THE DISTRIBUTORS AND TRANSPORTERS LIMITED (Messrs. Unilever's Distributing Organisation), Unilever House, Blackfriars, London, E.C.4, and the G.W. and L.M. & S. Railway Cos.	Per ton. Candles, Soap and Soap with articles for advertisement.
	Applicable to traffic consigned by five Associated or Subsidiary Companies.	
1935. No. 186—July 1, 1935	THE DISTRIBUTORS AND TRANSPORTERS LIMITED (Messrs. Unilever's Distributing Organisation), Unilever House, Blackfriars, London, E.C.4, and the G.W. and L.M. & S. Railway Cos.	Per ton. Margarine, Lard and Lard Substitutes.
	Applicable to traffic consigned by one Associated or Subsidiary Company.	
1935. No. 187—July 1, 1935	GRIFFITH & DIGGENS LIMITED, Palace of Industry, Wembley, Middlesex, and the G.W., L. & N.E. and L.M. & S. Railway Cos.	Per ton. Waxed Paper.
1935. No. 188—July 1, 1935	HARRODS LIMITED, Knightsbridge, S.W.1, and the G.W., L.M. & S., L. & N.E. and Southern Railway Cos.	Per ton. Furniture (other than Household Removals) and Genera Stores; Empties returned to Suppliers.
1935. No. 189—July 1, 1935	JOHN HORN (STOCKPORT) LIMITED, Bon Bon Works, Stockport, and the Cheshire Lines Committee and the L.M. & S. Railway Co.	Per ton. Confectionery.
1935. No. 190—July 1, 1935	JUDGE BRAND CO. LTD., 24, Eldon Square, Newcastle-on-Tyne, 1, and the L. & N.E. Railway Co.	Per ton. Enamels, Varnish, Polishes, Stains, Dressings, Dyes, Paints, Colours, Turpentine and Brushes.
1935. No. 191—July 1, 1935	WILLIAM MACDONALD & SONS, Cardonald, Glasgow, S.W.2, and the L. & N.E. and L.M. & S. Railway Cos.	Per ton. Biscuits.
1935. No. 192—July 1, 1935	THE MANCHESTER MUTUAL TRADING ASSOCIATION LIMITED, 36, Granby Row, Manchester, and the Cheshire Lines Committee and the G.W., L. & N.E. and L.M. & S. Railway Cos.	Per package. General Household Requisites.
1935. No. 193—July 1, 1935	MARR, DOWNIE & CO. LTD., 48, Avenue Street, Bridgeton, Glasgow, and the L. & N.E. and L.M. & S. Railway Cos.	Per ton. Stationery, Paper, Books and Stationers' Sundries.
1935. No. 194—July 1, 1935	OXENDALE & CO. LTD., Granby House, Granby Row, Manchester, and the Cheshire Lines Committee and the G.W., L. & N.E., and L.M. & S. Railway Cos.	Per package. General Household Requisites.
1935. No. 195—July 1, 1935	HARRY RUDGE, Islington Works, Halesowen, and the G.W. and L.M. & S. Railway Cos.	Per ton. Iron or steel Chains, Holdfasts, Nails, Spikes, Nuts, Bolts, Rings, Wall Ties, in consignments not exceeding 2 tons each in weight; Iron or steel Common Gate Hinges, Hooks, Wall Brackets; Empties returned to Suppliers.
1935. No. 196—July 1, 1935	THE SHREDDED WHEAT CO. LTD., Welwyn Garden City, Herts, and the G.W., L. & N.E. and Southern Railway Cos.	Per package. "Shredded Wheat."
1935. No. 197—July 1, 1935	SPRING & CO. LTD., Brigg, Lincolnshire, and the L. & N.E. Railway Co.	Per ton. Bottled Fruit, Canned Fruit, Honey, Jam, Lemon Curd, Marmalade, Fruit Cordials, British Wines.
1935. No. 198—July 1, 1935	T. G. TICKLER LIMITED, Grimsby, and the L. & N.E. Railway Co.	Per ton. Bottled Pickles, Bottled Fruit, Candied Peel, Cordials, Jams Mincemeat, British Wines and Honey.
	Applicable also to traffic consigned by one Associated or Subsidiary Company.	
1935. No. 199—July 1, 1935	T. G. TICKLER LIMITED, Grimsby, and the G.W., L. & N.E., and L.M. & S. Railway Cos.	Per ton. Empty Cases and Jars returned to the Trader.
1935. No. 200—July 1, 1935	CLIFFORD WILLIAMS & SON LTD., Anne Road, Handsworth, Birmingham, 21, and the G.W., and L.M. & S. Railway Cos.	Per ton. Clothing, Empties returned to Suppliers.
1935. No. 201—July 1, 1935	GEORGE BRETTLE & CO. LTD., 119, Wood Street, London, E.C.2, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package. Gloves, Hosiery and Textiles.
1935. No. 202—July 1, 1935	BRITISH VACUUM CLEANER AND ENGINEERING CO. LTD., London, S.W.6, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package. Vacuum Cleaners and Parts.

Legal and Official Notices—*continued*

Number of Application and Date of Lodgment	Parties to Agreement	Nature of Agreed Charge
1935. No. 203—July 1, 1935	J. HENRY BROOKE LIMITED, 19/25, Nile Street, London, N.1, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package. Clothing.
1935. No. 204—July 1, 1935	FARMA CREAM PRODUCT CO. LTD., 23/25, Prince of Wales Crescent, London, N.W.1, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package. Farma Cream.
1935. No. 205—July 1, 1935	FREEMANS, 103/109, Lavender Hill, London, S.W.11, and the Southern Railway Co.	Per package. Clothing, Drapery and General Stores Wares
1935. No. 206—July 1, 1935	A. GOLDENFELD & CO. LTD., 101, High Street, Whitechapel, London, E.1, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package. Boots, Shoes, Electric Lamp Bulbs, Haberdashery and Textiles.
1935. No. 207—July 1, 1935	HARRODS LIMITED, Knightsbridge, S.W.1, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package. Clothing, Drapery and General Stores Wares.
1935. No. 208—July 1, 1935	KEARLEY & TONGE LIMITED, Mitre Square, London, E.C.3, and the G.W. Railway Co.	Per package. Cooked Meats, Brawn and Sausages.
1935. No. 209—July 1, 1935	MOORE & SONS, Looe, Cornwall, and the G.W. Railway Co.	Per ton. Rabbits (dead).
1935. No. 210—July 1, 1935	R. S. NORRISH & SONS LTD., Sampford Peverell, and the G.W. Railway Co. ..	Per ton. Butter and Cream.
1935. No. 211—July 1, 1935	THE NOTTS HOSIERY CO. LTD., 44 and 44a, Gutter Lane, Cheapside, London, E.C.2, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package. Hosiery.
1935. No. 212—July 1, 1935	PALETHORPES LIMITED, Tipton, and the G.W. and L.M. & S. Railway Cos. ..	Per ton. Sausages, Tongues, Brawn, Boned Hams, Pressed Meat, Meat Pies, Black Puddings and Advertising Matter.
1935. No. 213—July 1, 1935	SAXONE SHOE CO. LTD., Kilmarnock, and the L.M. & S. Railway Co.	Per package. Boots and Shoes.
1935. No. 214—July 1, 1935	TONKIN BROTHERS, Church Street, Kingsbridge, Devon, and the G.W. Railway Co.	Per ton. Rabbits (dead).
1935. No. 215—July 1, 1935	LUKE TURNER & CO. LTD., Deacon Street, Leicester, and the L. & N.E. and L.M. & S. Railway Cos.	Per package. Elastic Webbing.
1935. No. 216—July 1, 1935	SAXONE SHOE CO. LTD., Kilmarnock, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package. (i) Boots and Shoes from Kilmarnock. (ii) Boots and Shoes received at Kilmarnock from Trader's Branch Shops.
1935. No. 217—July 1, 1935	EUGENE LIMITED, Edgware Road, Hendon, London, N.W., and the L.M. & S. Railway Co.	Per package. Papier Sachets and small parts of Hair Waving Machines.

South Indian Railway Company Limited

THE Directors are prepared to receive Tenders for the supply of :—

COPPER RODS, BRASS RODS AND SHEETS, &c.

Specifications and Forms of Tender will be available at the Company's Offices, 91, Petty France, Westminster, S.W.1.

Tenders addressed to the Chairman and Directors of the South Indian Railway Company, Limited, marked "Tender for Copper Rods, &c.," with the name of the firm tendering, must be left with the undersigned not later than 10 a.m. on Friday, the 12th July, 1935.

The Directors do not bind themselves to accept the lowest or any tender.

A charge, which will not be returned, will be made of 5s. for each copy of the Specification.

A. MUIRHEAD,
Managing Director.

91, Petty France,
Westminster, S.W.1.
3rd July, 1935.

ASSISTANT TRAFFIC MANAGER required for large Industrial Company in Midlands. Thorough Railway Head Office experience in rates essential. Apply stating age, experience and salary required.—Box 25, c/o THE RAILWAY GAZETTE, 33, Tothill Street, London, S.W.1.

THE Proprietor of the Patent No. 191494 for "A Valve Cut-off Correction Instrument" is desirous of entering into arrangements by way of licence and otherwise on reasonable terms for the purpose of exploiting the same and ensuring its full development and practical working in this country. All communications should be addressed in the first instance to : HASELTINE LAKE & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Thursday. All advertisements should be addressed to :—*The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

CONTRACTS AND TENDERS

The North British Locomotive Co. Ltd., has received an order for two 3 ft. 6-in. gauge 2-8-2 locomotives with double bogie tenders for the Newfoundland Government Railways.

D. Wickham & Co. Ltd. has received orders for one No. 5a petrol-driven inspection trolley and one four-seater engineer's car for the Antofagasta (Chile) & Bolivia Railway.

D. Wickham & Co. Ltd. has also received an order for five pump trolleys for the South African Government Railways & Harbours Administration.

Anti-friction Bearing Orders

The SKF. Ball Bearing Co. Ltd. has received orders for SKF. roller-bearing axleboxes as follow :—523 bearing boxes for streamlined diesel-electric motor coaches and passenger coaches, South Manchuria Railway, having the spherical roller bearings mounted on the journal with withdrawal sleeves to facilitate quick mounting and dismantling ; 480 bearing boxes for electric rolling stock, Paris Metropolitan Railway ; 1,400 spherical roller bearings for electric motor-coach axleboxes, Polish State Railways ; and 440 roller-bearing boxes for coaches for the Belgian National Railways (supplied by A. B. Svenska Kullagerfabriken, Sweden, and each containing two SKF standard spherical roller bearings).

Large Locomotive and Rolling-stock Orders for Sweden

Nydqvist & Holm, Trollhätten, Sweden, is supplying 100 locomotives and 1,500 wagons and passenger coaches for new railways under construction for the Turkish Government. See also news paragraph on page 36.

Boilers for India

The North Western Railway of India Administration has recently placed orders for boilers as follow :—

Henschel & Sohn, A.G. : 15 superheated boilers for SP/S 4-4-0 locomotives, at Rs. 10,867·8 each, and 18 superheated boilers for HG/S 2-8-0 locomotives at Rs. 15,700 each

Vulcan Foundry Co. Ltd. : Three superheated boilers for HP/S 4-6-0 locomotives at Rs. 15,730 each.

North British Locomotive Co. Ltd. : One superheated boiler for N 2-10-0 locomotive at total price of Rs. 39,600.

Leyland Motors Limited has received an order from the South African Railways & Harbours Board for 23 Leyland Terrier vehicles for dual purpose, passenger and goods, work. These vehicles will be used in districts where separate passenger and goods services are not justified by the volume of traffic offering. The South African Railways Administration has been experimenting with six-wheeled vehicles fitted with dual-purpose bodies built in the Administration's own shops and designed on the lines of single-decked buses but having a front portion for passengers and a separate rear compartment for the conveyance of goods.

Leyland Motors Limited has also received the fourth order to be placed by Hants & Dorset Motor Services Limited, a railway-associated concern, for Titan vehicles fitted with Leyland torque converters. This order comprises eight vehicles. The Hants & Dorset already has 15 gearless Titan vehicles in service.

The Bombay, Baroda & Central India Railway invites tenders, receivable by July 25, at the White Mansion, 91, Petty France, Westminster, S.W.1, for steel plates, angles and rounds.

A. G. Wild & Co. Ltd. write with reference to the article on the employment of buckeye couplers on the L.N.E.R., published on page 1269 of our issue of June 28, and recall that they have had upwards of thirty years' experience in the manufacture of the buckeye type of coupler and Pullman vestibule, and are contractors to the L.N.E.R. for this equipment.

XUM

Railway Share Market

The market for home railway stocks took a better turn on Wednesday on the posting up of the past week's traffic receipts in the Stock Exchange. The market had been estimating for an aggregate gross increase of between £50,000 and £80,000 and the actual increase substantially exceeded this estimate.

Buyers were immediately about for stock and there was some indication that the dealers in the market had tended once more to over-sell stock with the consequence that a shortage made itself felt. London Midland & Scottish issues which had fallen late in the previous week on the decision of the Board to defer the question of payment of the half-year's dividend on the redeemable preference stock, made a good recovery and on balance are back to their former level. The 1923 preference stock, which was the most vulnerable since it has the largest speculative following, regained part of its former popularity. Southern preferred and deferred strengthened on the week's traffic increase and the prospect of record traffic attending the first week's operation of the newly-electrified coastal lines. London Passenger Transport Board's "C" stock was marked down earlier in the week by the dealers as a precautionary measure owing to the likelihood of stock being thrown on the market following newspaper reports of the big strike of ommibus workers, but the price subsequently steadied. Easily the most interesting feature in foreign railways was the sharp rise in Argentine railway stocks on confirmation of hopes held out by Lord St. Davids at recent meetings that now the exchange situation is easier there would probably be early payments of interest on the debenture stocks. The B.A. Pacific and the Argentine Great Western are paying eighteen months' arrears of interest on their second debenture stocks.

Following the actual announcement there were some profit-taking sales, but the tone of the whole Argentine railway market showed a distinct improvement on the early part of the year. The reduced activity of the market is unfortunately reflected in the wide movements in prices. Whereas in the home railway market stocks move up or down by $\frac{1}{8}$ or $\frac{1}{4}$, many Argentine railway prior charge stocks change by one to two points. Entre Rios issues moved in favour of holders.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1934-35	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1934	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1934	Prices: Lowest 1934	Prices: July 3, 1935	Yield % (See Note)
				£	£		£	£	£					
South & Central America.	Antofagasta (Chili) & Bolivia	830	30.6.35	13,360	— 970	26	321,400	338,280	— 16,880	Ord. Stk.	26¾	19	21	Nil
	Argentine North Eastern ..	753	29.6.35	7,818	— 671	52	392,556	428,310	— 35,754	,,	11	6⅞	7	Nil
	Argentine Transandine ..	111	—	—	—	—	—	—	—	A. Deb.	52	45	37½	10 11/16
	Bolivar	174	May, 1935	7,100	+ 500	21	33,400	33,650	— 250	6 p.c. Deb.	10	6½	10	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	13¾	10 7/16	13	3 15/16
	Buenos Ayres & Pacific ..	2,806	29.6.35	97,647	+ 15,395	52	4,182,552	4,421,116	— 238,564	Ord. Stk.	16½	8½	9½	Nil
	Buenos Ayres Central ..	190	16.6.35	$121,300	+ $10,100	50	$5,530,700	$5,331,900	+ $198,800	Mt. Deb.	23	10	21½	Nil
	Buenos Ayres Gt. Southern	5,085	29.6.35	111,941	— 45,325	52	7,353,728	8,018,685	— 664,957	Ord. Stk.	35	22	25	Nil
	Buenos Ayres Western ..	1,930	29.6.35	37,294	— 8,771	52	2,364,387	2,707,386	— 342,999	,,	27½	18½	20	Nil
	Central Argentine	3,700	29.6.35	125,950	— 4,926	52	6,348,277	6,841,091	— 492,814	,,	23	13½	15	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	14	7	8	Nil
	Cent. Uruguay of M. Video	273	29.6.35	9,031	— 6,374	52	688,279	845,537	— 157,258	Ord. Stk.	15½	8	5½	Nil
	Do. Eastern Extn.	311	29.6.35	1,464	— 2,255	52	100,155	177,735	— 77,580	—	—	—	—	—
	Do. Northern Extn.	185	29.6.35	982	— 2,055	52	59,396	102,548	— 43,152	—	—	—	—	—
	Do. Western Extn.	211	29.6.35	605	— 101	52	38,334	79,185	— 40,851	—	—	—	—	—
	Cordoba Central	1,218	29.6.35	34,350	— 1,840	52	1,468,910	1,691,390	— 222,480	Ord. Inc.	6	3	2½	Nil
	Costa Rica	188	Apl., 1935	13,045	— 1,659	43	162,371	181,164	— 18,793	Stk.	30¾	23½	32	6¼
	Dorada	70	May, 1935	10,900	+ 600	21	55,000	51,400	+ 3,600	1 Mt. Db.	103	95	102½§	5 7/8
	Entre Rios	810	29.6.35	11,118	+ 1,382	52	627,045	618,391	+ 8,654	Ord. Stk.	21½	12	13½	Nil
	Great Western of Brazil ..	1,082	29.6.35	4,600	— 1,200	26	211,900	209,200	+ 2,700	Ord. Sh.	⅞	⅝	½	Nil
	International of Cl. Amer.	794	May, 1935	$497,050	+ $21,927	21	$2,260,638	$2,466,672	— $206,034	—	—	—	—	—
	Interoceanic of Mexico ..	—	—	—	—	—	—	—	—	1st Pref.	1/-	1/-	½	Nil
	La Guaira & Caracas ..	22¾	June, 1935	3,915	+ 35	26	23,845	21,435	+ 2,410	Stk.	12¾	7⅝	8½	Nil
	Leopoldina	1,918	26.6.35	25,816	+ 1,830	26	564,209	553,193	+ 11,016	Ord. Stk.	14⅝	7	4½	Nil
	Mexican	483	21.6.35	$316,300	+ $96,900	24	$5,998,700	$5,566,000	+ $332,700	,,	3¼	1½	1	Nil
	Midland of Uruguay ..	319	May, 1935	6,298	— 2,303	48	104,046	103,709	+ 337	,,	1½	½	1½	Nil
	Nitrate	401	30.6.35	5,409	+ 545	26	72,513	76,698	— 4,185	Ord. Sh.	32/32	51/-	2¼	Nil
	Paraguay Central	274	29.6.35	$1,885,000	+ $360,000	52	$63,496,000	$41,003,000	+ $22,493,000	Pr. Li. Stk.	84	67	75½	7 15/16
	Peruvian Corporation ..	1,059	May, 1935	71,815	+ 9,303	48	697,276	619,408	+ 77,868	Pref.	14½	8	7½	Nil
	Salvador	100	22.6.35	¢11,750	+ ¢3,638	51	¢1,046,082	¢1,043,395	+ ¢2,687	Pr. Li. Db.	75	70	65	7 11/16
	San Paulo	153½	23.6.35	26,400	— 1,605	25	635,997	696,408	— 60,411	Ord. Stk.	86	67	52	4 13/16
	Taltal	164	May, 1935	2,680	+ 1,702	48	34,065	25,050	+ 9,015	Ord. Sh.	2⅛	1 7/16	1½	6 11/16
	United of Havana	1,365	26.6.35	18,676	— 974	52	1,202,739	988,903	+ 213,836	Ord. Stk.	6	2	2½	Nil
	Uruguay Northern	73	May, 1935	612	— 436	48	11,338	12,555	— 1,217	Deb. Stk.	6¼	3	4½	Nil
Canada.	Canadian National	23,735	21.6.35	673,358	+ 24,032	24	15,178,318	15,002,852	+ 175,466	—	—	—	—	—
	Canadian Northern ..	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	78¼	51½	56½	7 1/16
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	104½	97¼	100½	3 15/16
	Canadian Pacific	17,211	21.6.35	474,600	+ 46,000	24	10,667,800	10,741,200	— 73,400	Ord. Stk.	18 5/16	11 1/16	10	Nil
India.†	Assam Bengal	1,329	31.5.35	33,825	— 9,687	7	195,960	246,645	— 50,685	Ord. Stk.	88½	72	82½	3⅝
	Barsi Light	202	10.6.35	3,577	— 270	8	26,947	33,367	— 6,420	Ord. Sh.	10½	9¾	10	6 1/16
	Bengal & North Western ..	2,114	10.6.35	72,180	— 7,095	8	537,269	579,752	— 42,483	Ord. Stk.	29½	26	29 1/2§	5 7/16
	Bengal Dooars & Extension	161	31.5.35	2,911	— 761	7	18,436	20,339	— 1,903	,,	12¾	12	12½	5 9/16
	Bengal-Nagpur	3,268	31.5.35	202,575	— 9,925	7	1,119,525	1,085,186	+ 34,338	,,	10½	9	10½	3⅞
	Bombay, Baroda & Cl. India	3,072	20.6.35	234,150	+ 1,200	9	1,950,675	1,945,575	+ 5,100	,,	11	10	11 1/2§	5 5/16
	Madras & South'n Mahratta	3,230	31.5.35	175,575	— 33,641	7	962,025	1,105,558	— 143,533	,,	13	12	12½	7 13/16
	Rohilkund & Kumaon ..	572	10.6.35	13,850	+ 207	8	110,196	118,400	— 8,204	,,	26	25	29	5 12
	South India	2,526	31.5.35	122,689	— 15,121	7	690,432	725,090	— 34,658	,,	11	11	11	6 13/16
Various.	Beira-Umtali	204	Apl., 1935	71,379	+ 21,377	30	450,161	340,976	+ 109,185	—	—	—	—	—
	Bilbao River & Cantabrian	15	June. 1935	1,261	— 97	26	9,905	10,459	— 554	—	—	—	—	—
	Egyptian Delta	622	10.6.35	5,162	— 70	9	36,573	36,439	+ 134	Prf. Sh.	2 15/16	1¾	2 1/4§	4
	Great Southern of Spain ..	104	22.6.35	1,540	— 703	25	46,729	54,578	— 7,849	Inc. Deb.	4	3½	3½	Nil
	Kenya & Uganda	1,625	31.5.35	202,402	+ 11,533	21	1,127,245	1,050,349	+ 76,896	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	50	33	41½	8 7/16
	Mashonaland	913	Apr., 1935	132,251	+ 38,693	30	820,037	624,162	+ 195,875	1 Mg. Db.	101	91¾	103	4 7/8
	Midland of W. Australia ..	277	May, 1935	13,048	+ 912	48	147,834	146,176	+ 1,658	Inc. Deb.	100	93	94½	5 5/16
	Nigerian	1,905	18.5.35	26,250	— 1,334	6	200,239	190,762	+ 9,477	—	—	—	—	—
	Rhodesia	1,538	Apr., 1935	205,519	+ 50,699	30	1,342,580	1,063,276	+ 279,304	4 p.c. Db.	104⅞	97½	104	3 15/16
	South African	13,217	8.6.35	542,247	+ 50,923	10	5,327,770	4,742,892	+ 584,878	—	—	—	—	—
	Victorian	6,172	Feb., 1935	753,986	— 19,539	34	6,340,598	6,162,144	+ 178,454	—	—	—	—	—
	Zafra & Huelva	112	May, 1935	10,848	— 233	21	55,398	55,722	— 324	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16

† Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend. Salvador and Paraguay Central receipts are in currency

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rate of exchange and not on the par value